



FRIDAY, AUGUST 31.

Contributions.

Minor Stations and Yards of Double-Track Lines.

[NOTE.—In making the drawing from which the diagram was engraved, which was published last week with the first article having this title, our draughtsman made an error, which rendered part of the article meaningless. We have therefore had the diagram, fig. 1, corrected, and republish it herewith. Persons interested in the subject are advised to reread the article, with the corrected diagram before them. The error consisted in connecting the up line at N with the side-track No. 1, instead of making the up line continuous, as shown herewith.]

II.

NEW HAVEN, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

SIR: In your last issue I discussed the arrangement of tracks and appliances used about the station-yard, together with the general location of the more important buildings,

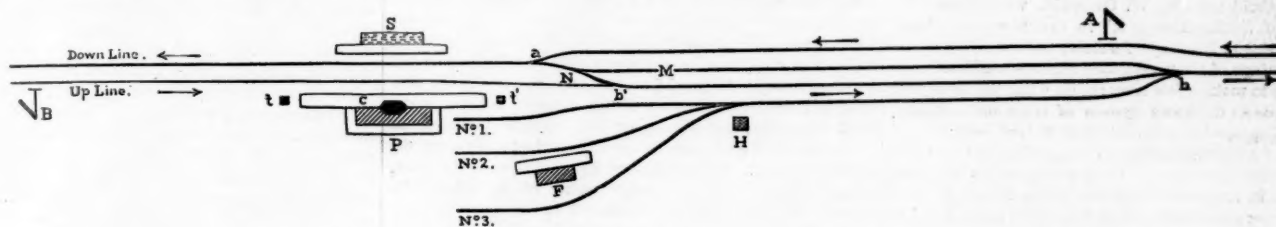


Fig. 1.

and it now remains to briefly consider the buildings themselves.

The details of freight stations vary so greatly with the nature of the freight traffic of each road that little can be said that can have very general application, but the needs of ordinary passengers are about the same everywhere, and certain elementary principles seem to have universal application to the construction of passenger stations.

is flanked by two windows W, which are conveniently located for passengers in checking baggage after purchase of tickets. These windows are lower and larger than the corresponding ones in the ticket office, so that hand-baggage can be readily passed through them.

The custom of having the baggage-master act gratis as package agent for arriving and departing passengers, issuing checks for bundles left in his charge, is fast coming into favor, and is a great convenience to passengers and but small expense to the company.

A hatchway can be placed at I, which, with a chute leading to the basement, is handy for storage of unclaimed baggage, and a light hoisting tackle can be used by the baggage-master in drawing the same back up the chute.

Steam heat is best and cheapest, the furnace being placed in the basement, and may be of the automatic regulator type, and a radiator can be placed at B. The room may be lighted by a small window over the door C, in addition to such light as finds its way through the windows W.

The combined ticket and telegraph office has the usual bay window, affording an unobstructed view of the yard and of moving trains. The telegraph table or shelf built across it has a desk K located in the centre of same. A very convenient arrangement for this desk is to place it on a pivot, so that the window in front can be raised and the desk swung around and used by trainmen on the platform outside in signing for train orders, etc., a spring catch on its side holding it securely in its several positions; or, if

more privacy be desired, a special room with door opening on to platform and window communication with telegraph office may be located at R, in which case a desk shelf should be placed under the window in this room for use of trainmen, etc.

The telegraph instruments are located at L, and beneath the desk are shelves for storage of stationery, records, battery jars, etc. The table is cut away at the ends, giving ac-

cess to the two side windows W², and facilitating access through the door M and to the levers N of the signal apparatus, four in all, two for the distant signals A and B and two for the train-order semaphores t and t' (see last week's diagram).

At O, between the ticket windows, is placed the ticket case, and beneath it a small safe for cash derived from ticket sales. The space beneath the ticket windows W¹ W¹ is occupied on one side by a steam radiator and on the other by a small storage closet for miscellaneous articles.

Turning now to the main waiting rooms, the general finish of the interior deserves a word. Plaster or similar finish cracks, and in such public buildings soon becomes badly soiled and defaced, unless colored much darker than is desirable. The present style of finish, in light woods with shellac or oil, preserves its neat and tasty appearance perhaps longer than any other, and does not absorb the light at night and on dark days. Varnish, especially on mahogany or other dark woods, should be avoided. It quickly scratches and becomes unsightly in the extreme. Black walnut finished in oil has a rich appearance and wears well, but is not as cheerful as some of the lighter woods.

All posters, time-tables, etc., should be confined to the neighborhood of the ticket windows, and the walls of the waiting rooms kept scrupulously free from the monstrosities of modern railway advertising. A bulletin board for announcement of delays in trains is used by some roads, and meets the approval of passengers. Concerning illumination, side bracket lights are to be preferred to centre chandeliers, as they afford better facilities for passengers to read, etc. The heating is effected by two radiator coils located at H H, as per diagram, one for each division of the waiting

room. For side settees the patterns formed of thin perforated board, bent to proper shape, are neat and clean, give good satisfaction, and are coming into general use; they also harmonize well with the light interior finish already mentioned. A small table and a rocking chair will have due appreciation if placed in the ladies' room.

Water coolers may be located at P and P¹, and the ticket windows should be protected by the usual guard rails Q and Q¹.

Doors should be double rather than single, should open inward and be kept closed by the new noiseless air-cushion spring. Water-closets are located as per diagram and constructed in the usual manner, the ladies' being of more ample proportions and furnished with mirror and wash-basin.

Electric bells announcing the approach of trains are convenient for both passengers and employes, are rapidly coming into use, and can be supplied by the signal company spoken of last week.

A local railway guide and a reliable railway map, both placed where they can be readily consulted, are a great convenience to travelers.

As to the exterior, it is sufficient to say that platforms should be roofed over. The roof can be supported by side brackets in front of the building and by central posts beyond.

Should the volume of business demand it, a down-line platform and waiting shed should be erected opposite the station, with a plank walk between them; otherwise a

platform should be placed between the two tracks and the up-line track planked for the convenience of down-line passengers.

Low platforms, say one foot above the surface of the ground, with low steps to passenger cars, are altogether preferable to the old style of high steps and high platforms. What I have written, while old to many, may prove, I hope, of practical use to some few.

EDWIN A. HILL.

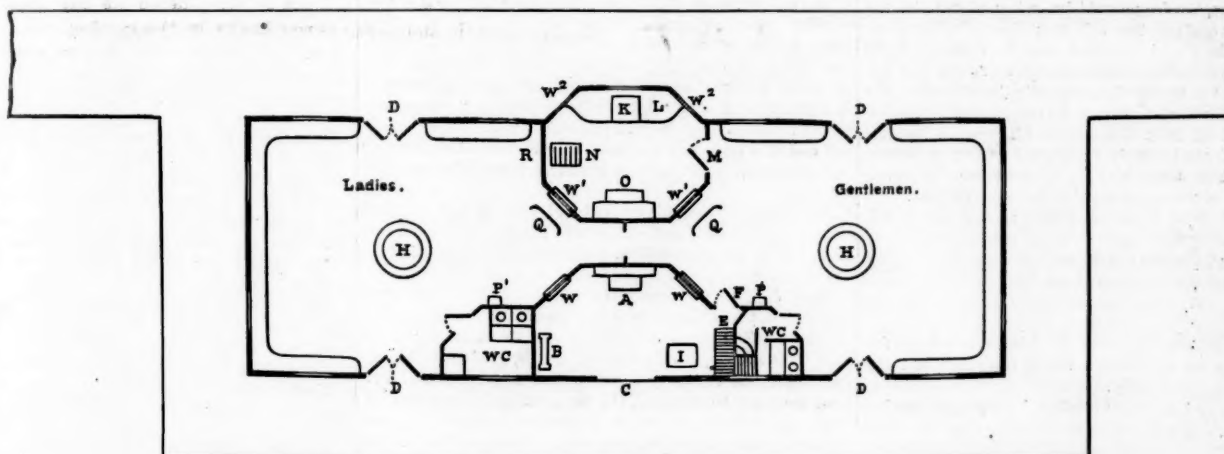


Fig. 2.

My own experience with such constructions would in this case indicate something similar to the accompanying ground plan.

The general points aimed at in this design are, first, to place the agent and operator where he can command an unobstructed view of the yard operations and of all approaching trains as well as of the station interior, which being done he can be consistently held to a certain additional amount of responsibility; second, to substantially separate the ladies' from the gentlemen's portion of the station; third, to give waiting passengers a full view of approaching trains.

These things being accomplished the baggage room necessarily falls to the rear, as in any other position it would interfere either with the agent or the passenger. The principal objection to so locating it is the removal of the baggage-man from the immediate neighborhood of the trains, which objection is met by giving him a full view of them through the windows W. So far as the question of trucking baggage from rear to front is concerned, there will not be much more of it in the long run than if the room be located in front and at one end of the building, and what is more important, such trucking will interfere far less with arriving and departing passengers, as no trucking whatever need be done in front of the building. Moreover, the rear is a more convenient location for teams in the receipt and delivery of baggage.

The main door at C will interfere least with baggage, etc., if made to slide rather than fold, especially in small buildings, where space is limited. A small door at F communicates with the station interior and also gives access from the interior to cellar stairs at E, there being no upper story.

At A is placed a desk and case for baggage checks, which

cess to the two side windows W², and facilitating access through the door M and to the levers N of the signal apparatus, four in all, two for the distant signals A and B and two for the train-order semaphores t and t' (see last week's diagram).

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A Diagram for Train Dispatchers.

SHARPSVILLE, Mercer Co., Pa., Aug. 27, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read the communications made to the *Gazette* by Mr. Appleton, suggesting apparatus for the use of train dispatchers by means of which the position of each train en route over a road would be indicated, as the train advanced from point to point, by a "dummy," or block, moved forward in a groove in accordance with the successively received reports from the several stations; and have noticed Mr. Fowler's letter proposing a substitution of holes and pegs for grooves and blocks; also H. T.'s—what shall I say—vigorous, remarks upon the original suggestion and the amendment proposed by Mr. Fowler. H. T.'s opinion that the board "diagram," with either peg or blocks would be "cumbersome," etc., is, I think, well founded. Furthermore, in figuring the confusion that would follow the overturn of the board, with its blocks or pins, he calls attention to the fact that a "diagram" such as would be presented by the board arrangement is not that permanent and continuous record of the progress of the trains that should be made.

Let the dispatcher provide himself with scaled sheets like those used by the superintendent of his division in making up his "time-cards"; sheets ruled with horizontal lines showing positions of stations, extremities of sidings, etc., etc., and divided by vertical lines into hour spaces and such minor time spaces as may be deemed necessary.

Then with an "indelible" pencil let him trace on the sheet in blue, the progress of each train moving west or south, and with like pencil, in red, the progress of

each train moving east or north; and he may, without moving pegs or blocks, keep before him a clear and unmistakably significant illustration of the manner in which the road is occupied at the time of the receipt of any train report, and of the progress, positive and relative, of the trains respectively. And not only that, but he will have, for filing away at the end of each day's work, a permanent record of the movements of the several trains of that day.

Or he might use sheets like the one shown in the drawings accompanying specifications to Patent No. 150,150, issued April 28, 1874, in which I illustrated a method of tracing the progress of trains that has some of the features of that above described.

But for the purpose in view, the "time-card" chart will be preferable, because it will afford a more strikingly graphic exhibit of the conditions, a clear showing of which is essential.

J. M. GOODWIN.

Putting in Frogs.

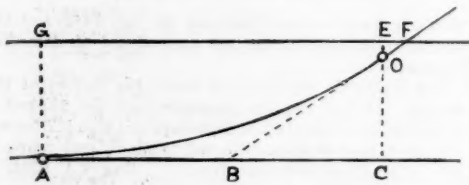
TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice in your issue of 20th July of your valuable paper articles by several of your correspondents, on switches, frogs and instructions to section-foremen. It seems to me that they are laboring under a delusion as to the true relation of a frog to the switch curve, as well as being unable to give formulas that will have the desired or same result.

First, I would ask Mr. W. Griswold, writing on "Instructions to Section-foremen," in the above-mentioned issue, to reconsider his simple formula, and see if he is not taking advantage of the uneducated section-foreman.

Permit me to make a few remarks on what seems to your correspondents an unknown system of frogs and switches, before entering into the calculations of its lead, etc.:

The plan of a frog is a series of straight lines, or in other words, when constructed will form a tangent to a curve, when placed in its proper position, unless intended for a special purpose; and in such a case it is either constructed to the required curves, or distorted by the trackman to suit the



same. Therefore, the frog should be, when placed in the track, as theory and practice call for; and in addition to the tangent of the frog, it is good practice to lengthen the said tangent in proportion to the number of frogs, but not to such an extent as to practically impair the degree of the switch curve. By the insertion of this tangent between the curve and point of frog, the degree of curve is thus increased, but this can be easily overcome by using a lighter angled frog. The total lead will, therefore, be much shorter than your correspondents' calculations call for.

The benefits derived from the above system are as follows, viz.: That by turning the whole angle previous to entering the frog, the centrifugal force of the moving body will coincide with the direction of the frog, obviating thereby the great lateral strain that would otherwise be exerted on the frog.

I may here say that this system has been carried out for over seven years on the Lehigh Valley Railroad, and the results have been satisfactory.

My objections to your correspondents' system of putting in a switch and frog will simply be to ask them to locate their switch curve, of a large-angled frog, as calculated, by a sufficient number of ordinates, and see for themselves where the straight line of the frog will come. To distort the frog is clearly absurd.

The calculations are as follows:

Let DF = tangent to switch curve, AB , BD = switch curve tangents, CE = gauge, F = frog.

$$\text{Then } ED = DF \times \sin. F$$

$$CD = CE - ED$$

$$AB \text{ or } BD = \frac{CD}{\sin. F}$$

$$\text{Chord } AD = \frac{CD}{\sin. \frac{1}{2} F}$$

$$GF = \text{number of } F \times CE + AB.$$

$$\text{Switch rail}^2 = R \times 2 \text{ throw.}$$

I do not write this article for the use of the section-foreman, as your correspondents have done. I certainly might have done so, but when in the act, I was puzzled to know whether the section-foreman or I would be made the greater fool. It is my experience, and I cannot see how it has failed to be theirs, that section-foremen are usually more or less void of education, or even reasoning, rendering it impossible for them to see the benefits to be derived from the above described system. Far less can it be expected of them to work out the simplest formula connected therewith.

I am somewhat inclined to think this switch and frog question interests the road-master, his assistant, and the engineer more than any other class of men, as they are the proper persons to locate such work and take the responsibilities thereof.

I hope your correspondents will continue to express themselves on that almost unknown branch of engineering—frogs and switches—which the engineer considers too small or simple a matter to waste time over, previous to knowing any more than the misused section-foreman, and vice versa.

A. MORRISON, C. E.

Experiments with Steam Whistles.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your article of last week on steam whistles seems to seek information as well as to give it, and, as we have made the subject in some respects a special study, you may think proper to publish these remarks.

We have nothing to say about the "sufferings" the blowing of whistles causes to certain persons, because that, in these days of universal noise and hubbub, would lead us too far. We do not believe, however, that the whistle sound is as disagreeable as is represented, while as a signal of caution for grade crossings and for many other purposes it is greatly superior to any other.

But as to the whistle as an instrument of sound. We think Clark's formula a mistake, as will be seen further on, as also some of the results or deductions quoted from Messrs. Duane and Henry.

Our experiments, which we admit were far from being exhaustive, were made on a locomotive and with steam varying from 60 to 135 lbs. pressure, and most of them with a whistle having a bell $4\frac{1}{8}$ in. diameter, $3\frac{3}{4}$ in. long from lip to head (inside), and an annular steam opening of $\frac{1}{8}$ in. wide.

This whistle at 60 lbs. pressure gave the sound of E natural, at 80 of F sharp, at 90 of G, at 110 of A, and at 125 to 130 of C sharp in alt. The distance between the steam opening and the edge of the whistle was $1\frac{1}{2}$ in.; when this was raised to 2 in. the power of the sound was sensibly lessened, but its pitch was altered relatively but half a tone. When, on the contrary, it was diminished to 1 in. and to $\frac{1}{2}$ in., the whistle would sound nothing but its supertones, or "squeal" as the boys call it. The bell in these experiments was made of cast brass of medium, not a hard character, and the lip or edge carefully chamfered down to a thin edge, set so as to stand exactly over the steam opening. The quality of its sound was very clear, penetrating, and even "reedy," owing to its thin, elastic shape. The power may be estimated by the fact that on a clear, still night it has been heard at Mansfield from Attleboro, a distance of over six miles.

We afterward repeated the experiment with a bell of the same dimensions, but made of brass tubing, annealed, hammered and then heated again, with somewhat the same results, the intensity of the sound and the pitch being somewhat heightened. The next experiment was made with an iron whistle of the same size, which was unsuccessful, the traveling quality of the sound being greatly reduced. The last trial was made with a whistle $6\frac{1}{4}$ in. diameter, $3\frac{1}{2}$ in. long and set over an annular opening $5\frac{1}{2}$ in. diameter, blown at a pressure of 150 lbs. The sound given by this whistle was greatly inferior to that of the first one, lacking power and vibratility of tone, which we attribute to the size of the bell, which was so much larger than the diameter of the steam opening as to make of it what Professor Henry calls a "resounding cavity;" and if any one will place his mouth over the hollow end of a brass key and blow into it, instead of directly upon its edge, he will have a practical illustration of what we say.

As confirmation of this we will add that we took a bell of the size first named, and cut into it three longitudinal and three perpendicular slits 3 in. long, which had some effect on the character but none on the power of the sound.

With regard to the penetration of the sound obtained from the whistle in distinction to other sounds or noises made at the same time, the greatest effect was obtained by "dragging" the whistle, as it is termed; that is, gradually opening and closing the valve, by which means a gradation of five semi-tones can be obtained, the ear seeming to have peculiar appreciation of this change of relation—as in an organ the effect of power is gained more from the crescendo of the "swell" than from the "full organ" itself.

As for the "disagreeableness" of the sound, that is (as you observe) so much a matter of taste and constitution that we do not pretend to argue it. It has, however, always been a subject of surprise to us that railroad men insist upon the whistle of its present shape and effect. As a general rule the latter is required for distances within a half mile; but in many cases this must be very powerful within that limit. Now if instead of a "whistle" a "horn" were to be used, the gain in useful effect would be great, while the "disagreeableness" of tone would be much if not entirely reduced. The form of such a "horn" with a "mouthpiece" or forcing tube would be extremely simple, of inconsiderable expense (less than that of the ordinary whistle), and instead of the "screaching" sound of the latter it would yield the mellower tone of the modern tuba or cornet-a-piston, to which we suppose most persons will not object. LLOYD & SYMES.

BOSTON, Aug. 27, 1888.

City Cab and Carriage Service.

BOSTON, Mass., Aug. 20, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

One of the local features of a city which naturally awakens a traveler's interest is its cab and carriage service. There is of course less variety of method met with in this country than across the water; but differences between American cities and towns in this respect are much greater than in other matters; they are perhaps exceeded in variety only by methods of delivering milk, which present local peculiarities slightly ridiculous. Milk is delivered in New York in large cans with detached tin covers; in some smaller cities the can is a very large one, and the milk is drawn off by a faucet; in New England the can becomes a comparatively small one, sometimes an absurdly small one for the shape, and is closed with a plug, etc.

New York city, perhaps by reason of its peculiar political conditions, has retained its hack against all innovations except the coupé, which, however, is also a high tariff vehicle—\$1 per course, \$1.25 per hour. Of the 3,000 carriages in New York, about 2,000, the majority coupés, have been added in the last ten years. An illustration of the city's political comity with the cab service is a late by-law made, I am told, by the Board of Aldermen that the printed tariff shall or may be posted under the seat. Cheap cabs have had more than the habits of the general public to contend against, although some hopeful experiments have failed by lack of fitness to these. The "crystal cabs," which it was attempted to introduce into New York some years ago, are here in Boston. Philadelphia is trying the London "hansom," and, it may be, very successfully. Two Englishmen brought over to Boston their hansoms, but failed in getting an established trade here. One or two "herdies," seating only two persons, were run here a short time at a loss.

The "herdic" is a general name for stage-like vehicle invented by Peter Herdic, of Williamsport, Pa. At least several of the varieties of cabs which will be referred to under this name are rather the results of the experience of the herdic stage and cab than vehicles which properly bear the name. My first experience with herdies began in Washington, where, in the shape of a long, low stage drawn over the smooth streets of the city by one horse, the original vehicle has proved, I believe, quite successful. This stage herdic was for various reasons (especially because of poor construction and the rougher streets) unsuccessful in Boston and other cities of New England, into which it was introduced as a depot conveyance on a tariff of 10 cents a course. Two-wheeled herdies, carrying four persons, with facing seats, rear entrance, and a sliding port for communication with the driver, were also introduced into Boston, and are still running here under various names. They have the advantage of ability to turn in close quarters, are easier for the horse but less easy for passengers, at least for single passengers, than a four-wheeled herdic, which was introduced later, and which is perhaps more popular, especially with ladies, although it is said gentlemen in haste prefer a two-wheeler.

The builder of these vehicles, if I am not mistaken, made certain improvements on them, and succeeded in organizing a co-operative company or association to run them. Each member of this association owns his own cab and horses, is licensed individually by the city and is governed by the rules of the association, sharing in certain privileges of stands, etc., which the association has been able to obtain in the city and at the depots. A street stand, of course, is nothing whatever unless there is a carriage upon it; and while each driver has his stand, the rules and customs of the association insure that it is, as far as possible, covered in his absence. A wandering cab turns upon and stops at the first vacant stand belonging to the association, thus saving frequently a considerable journey to its own. For shopping when a lady is one of the party, no vehicle is equal in its advantages to the Paris coupé, now well known in several, if not all of our cities. A dollar or half-dollar per course is, however, too high a rate for any person who gladly classes himself or herself with the general public. A "course" is the usual requirement of a passenger, and 25 cents per course is, the world over, a sum that can be paid with serene satisfaction of mind by almost any one having sufficient means to travel.

The objection to a stage-like vehicle is its entrance from and exit upon the streetway, and not the sidewalk, although the latter advantage may be obtained by the cumbersome method of backing a vehicle to the walk.

Unobstructed and easy view of the way is another advantage of the coupé, the hack to a less degree, and the hansom to a pre eminent degree. The better class of herdic vehicles, however, present fair opportunities in this respect, although obliging one to turn the body somewhat to obtain them.

The easy communication with the driver is in a city one of the very essentials of a good vehicle. Many persons will remember the ease with which the late Mr. Greeley's driver was able "to carry out his instructions" on that famous ride to a lecture appointment during Mr. Greeley's trans-continental excursion.

In this respect the hansom and the herdic are probably superior to all other public vehicles. Some of the Boston herdies have a bell and a sliding port for the communication with the driver; the hansom has an overhead port, which reminds the passenger who is communicating with the driver of a well curb and cover. Nevertheless no vehicle is so easily guided by the passenger as the hansom. The difficulty with all two-wheel vehicles is the peculiar shake which they suffer—the most perfectly balanced one being the hansom—certainly the best of all two-wheelers for the horse and perhaps for the passenger.

The door and exit of the herdic are superior, I think, to those of the hansom. It is, however, one of the disadvantages of the common herdic that the driver may be obliged to leave his seat and the control over his horse to open the door for the passenger. Many of the Boston herdies, or rather herdic-like cabs, have double doors and an apparatus for opening and controlling them from the driver's seat.

The question of baggage delivery is very often a pressing one on taking a vehicle, and in this respect the top of the herdic offers peculiar advantages for the carriage of light articles, but serious obstacles to placing trunks in such a high position as the foot-board.

One of the reasons why cabs have thriven here is, perhaps, the absolute freedom from cheating. There is no necessity of making a bargain, for the driver never asks more than his tariff allows.

There is, I believe, a company forming in New York for

the purpose of introducing the improved cabs, or, as they are called here, "standard cabs," and there is another already formed which will shortly begin to run at a low tariff coupés and perhaps hansoms.

I have these facts largely from conversation with a very intelligent driver, and a still more intelligent cab-man, and from some extended experience as a traveler; and I make use of them here not as expert opinions, but as a traveler's view of a means of transportation in which railroad men have a very serious interest.

X. Y. Z.

Handling Freight in England—Capstans and Cranes.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It is not very long since the stout oaken capstan on board ship was the only representative of its kind, when the Scotchman with his bagpipes sat in the middle encouraging the sailors with his musical drone to "heave in" at the capstan, and thus weigh the anchor. But now not only the sailor, but railway men and many others, including the man who moves his house along the street in some Western city, all know and make use of this mechanical device to haul great weights.

But it is with capstans in freight yards and warehouses with which we have now more especially to deal. And not with those which are turned by hand, but those where the hand of man has only to make a couple of turns of rope round the iron capstan, and watch the iron muscles of the little laborer do the work.

There are two styles of capstans in common use in England; those driven from underground shafting, and those driven by separate engines, generally by hydraulic power. The former are connected by bevel gear to the main shafting, and are constantly running as long as the engine is at work. The head of the capstan is often made of two pieces, the upper part, which receives all the wear of the rope, being made of chilled iron and screwed on to the lower half which is not worn by this friction, and is therefore more permanent. The shaft on which this head is keyed passes down through a square casting, which is firmly bolted to a stone or brick foundation by four stout bolts. A long bearing piece is fixed to this casting for the shaft to revolve in; and a bevel wheel is keyed on the lower end of the shaft, which is geared into a smaller bevel wheel on a horizontal countershaft, which is in its turn driven from the main shafting. In this manner as many as a dozen capstans may be driven from the same engine, each capstan when worked alone being able to exert the full power of that engine. These power capstans are, however, dropping out of use on account of the misuse of the great power possessed by them, which frequently results in a broken rope, or still worse, a broken limb, and hydraulic capstans of various makes have taken their place.

Among the earliest of these was a capstan made by Sir William Armstrong, still much in use. A little hydraulic engine of three oscillating cylinders placed side by side was firmly fixed to the ground below the capstan, and was made to drive the latter through a pair of reducing bevel wheels. The cylinders were stout brass castings, and the water pressure acted only on one side of the piston or ram. The valve chests and valves were also of brass, and all the fixed joints in the pipes and machinery were made of gutta-percha. Another successful method was that of making the three cylinders work directly on to three cranks in the capstan spindle.

But the most generally adopted type is that resulting from an application of the Brotherhood three-cylinder engine to the capstan. In this compact combination a cast-iron pillar inside the capstan-head forms a long bearing for the capstan spindle. At the lower end of the latter, immediately below the bed-plate, is a single crank, on which three cylinders work, ranged at angles of 120 degrees with one another, these cylinders being of iron, cast in one piece, and bushed with phosphor-bronze. The rams are of brass or phosphor-bronze, having a long bearing in the cylinder; and each is packed with a cup leather, which is the universal packing for hydraulic cylinders, ingeniously arranged so that the pressure of water behind the ram opens the cup leather, and forms a tight joint with the cylinder. Unless these cup leathers are perfect in size and quality the rough usage of a capstan, or the admission of sand with the water, will soon find out the defect, through which the water at 750 lbs. pressure per square inch will soon be running to waste. These cup leathers are generally made of the best thick leather, and are pressed into the required shape between cast-iron dies. The three connecting rods which work on the one crank above mentioned, and which are always subjected to compression, owing to the cylinders being single acting, are made of cast-iron; and as in the case of the Westinghouse engine, they can for the same reason be run at a very high speed.

The distribution of water to these cylinders is effected by one valve placed vertically below the centre of the capstan and driven by means of a brass disk on the lower end of the crank. The valve is of brass, and is circular. It contains a pressure port opening on its underside into the valve chamber, where the water is admitted from the pipes; and an exhaust port conducting the water from the cylinders, each in turn, back through the centre of the cylinder casting, whence it is conveyed in return pipes to the engine house, or to waste, as the case may be. This distributing valve is 5½ in. in diameter, and the face upon which it revolves is of lignum vitæ, a wood which has been found by its self-lubricating qualities to withstand the great pressure better than any metal, especially where grit is liable to pass through with the water. The port holes in this lignum-vitæ face are 1 in.

in diameter, and are bushed with short pieces of brass tubes, which keep their edges perfect. It is a point of great importance in this valve that there should be no lap; that the pressure should be on the rams during the whole of their forward stroke, and that it should then be instantly cut off and the exhaust port quite as instantly opened. Many hydraulic engines are fitted with a small relief valve in the water passages, through which any confined water may find its way back to the valve chest, if from any cause the valve should not open soon enough. But in these Brotherhood capstans there is no such relief valve, the main valve itself being forced off its seat in case of over-pressure in the cylinders. Some of these capstans, after being in use for a considerable time, gave signs of being out of order by stopping suddenly. This behavior was for some time unexplained, until it was found to be owing to the gear which drives the valve getting a little worn, and thus not opening the exhaust exactly at the end of the stroke. This little defect was easily remedied, but it shows how necessary it is to provide a prompt and reliable outlet to water, which is so inelastic that, if confined, it will either stop the machine, or have a disastrous effect at the weakest part of the structure.

The whole of this self-contained capstan, including the hydraulic engine which we are considering, is made complete in the shops, and is then ready to be dropped on to a stone or brick foundation, which is provided with a man-hole to facilitate the examination of joints or the renewing of the cup leathers. The starting and stopping of the capstan is effected by an ordinary spindle valve with a conical seat, which is opened by the foot through treadles placed on both sides of the capstan, and which is closed by weights. All the necessary levers connecting these two treadles with the valve, being four in number, are attached to the underside of the foundation plate.

Instead of providing access to the engine by means of a man-hole, some of these foundation planks are arranged on a hinge so that the whole capstan can be tilted up above the ground, thus enabling repairs to be more easily effected than in the necessarily confined space of a man-hole. This is no doubt a great convenience, and shows the advantage of paying special attention to the get-at-ability of parts of machinery, which like the capstans are kept so much warmer and safer when they are well confined underneath the ground.

There are many other little points of interest in the capstan above described which it would be useless to attempt to describe further without the aid of drawings to illustrate the details. Many of these details appear absurdly strong to an eye accustomed to steam machinery only; but water at 750 lbs. per square inch pressure cannot be kept within bounds by the same means as steam at 60 lbs. When well constructed they are an immense convenience in a freight yard, being a great and safe power in a small space. Each capstan can pull 10 loaded cars, or about 150 tons, and no more; its power depending entirely on the pressure of water supplied. Hence lighter ropes can be employed than those which were necessary when locomotives or other powerful machinery did the work, and thus the labor of carrying ropes about the yard is very much reduced.

The hydraulic cranes with which warehouses are stocked are generally of a light construction; especially if a secure fastening can be found overhead, in the roof or wall, where a shoe forming a pivot for the pillar can be secured; in which case the crane can be more conveniently and lightly constructed, and at the same time more clearance can be provided underneath the jib. In most cases the cylinder forms part of the pillar of the crane, the water being conveyed to and from it through a pipe in the centre of the shoe. This is, however, a very exposed position for the cylinder, and in the case of cranes which stand in the open air, it is either cased in with wrought-iron plates or placed entirely underground. At the Holyhead docks a very complete system of hydraulic machinery was put down five years ago. There, the warehouse cranes stand in the openings of a stone wall and have thus a secure fastening for the top and bottom of the pillar. The jib reaches out through this opening over the vessel, and slews from that position across a platform containing a weighing machine, over to the railroad cars on the other side of the platform. The cranes are of wrought iron, and the cylinders are placed underneath the platform, at such an angle as to enable the ram to sink back into the cylinder by its own weight, when the crane is empty and lowering. These cylinders are of double power, which is effected in the following manner: The ram of the main lifting cylinder is itself a cylinder containing a smaller ram. This smaller cylinder is the one generally used, the larger ram being kept in its place by a catch, which can be released when the larger power is required for a heavier lift. The slewing cylinders are placed side by side, their rams being connected by a chain which passes round the base of the pillar, and their valves are closed automatically when the jib has reached the limit of its swing. The slewing cylinders are one of the most valuable features in hydraulic cranes, for they place the jib completely under the control of the operator, thus enabling him to turn the crane round while in the act of lifting, and to deposit its burden at any given point in the circle of its range with the least possible delay.

There are different ways of varying the power of hydraulic cranes, one being that of varying the ratio of the pulleys in the lifting ram; and another being an ingenious device invented by Mr. Mills, by which the power of the two slewing cylinders can be united to that of the lifting cylinder by means of a simple chain connection, and an increased stroke of the rams. But none of these complications are regarded with very general favor, because it is found

that simplicity in working the crane is of more value than a little saving of water.

In all hydraulic machinery it is usual to provide an air cock at the highest point to which the water rises, in order to allow the air to escape on admitting water for the first time. And, as before mentioned, it is important to burn gas-jets near the cylinders or other exposed parts, during cold weather. With these precautions it is found that hydraulic machinery is perfectly reliable; and, as I have already endeavored to illustrate, it is in very general use throughout the warehouses, docks and freight-yards of England.

The use of gas as a motive power in large warehouses has been successfully tried in several parts of England, and its adaptability to places where gas is cheap deserves attention. The engines, of which the Otto silent gas engine is the most prominent example, are placed on the upper floors of warehouses, or wherever they are nearest their work, and the chief advantage over the steam engine lies in the absence of a boiler, or indeed of any visible fuel, and also in the little attention consequently required. Their advantage over the hydraulic system consists mainly in their being unaffected by the coldest weather and in their economy of power, of which the hydraulic system is necessarily so wasteful. As to the all-important question of economy, however, everything depends on the price of gas, which it may be mentioned is as low as 75 cents per thousand in some of the English cities.

A word about the lighter elevators which are used so largely in the hotels and large buildings of America for passengers and light freight may not be out of place here. The accidents which have from time to time happened to such elevators have made the British public very much afraid of them, especially of those worked by rope gear. A little more confidence seems to be placed in those actuated directly by a hydraulic cylinder sunk in the ground, which gives a more visible and direct support to the cage, than where the latter is suspended by ropes only. But the larger amount of friction and the slow movement of such elevators take away their real value for passenger purposes, and if such were placed in the Mills Building or other large office buildings in New York, in place of the rapidly moving elevators, which are at work there now, I fear that most of those who now make frequent use of them would walk upstairs. These direct acting elevators have been made up to a great height, the ram of one of them being 4½ in. in diameter, and having a stroke of 79 ft. In this case, however, the weight of the cage was balanced so as to take as much dead weight as possible off so slender a ram. The water pressure used in such elevators varies from 30 lbs. to 800 lbs. per square inch. But passenger elevators are not used in England to anything like the extent they are in America.

There seems again to be a general mistrust of all the various forms of safety apparatus, which have so often failed to act when most needed; so that the public in general prefer the exertion of walking up many flights of stairs to the slight risk of trusting themselves in the elevator, and it appears that the British public will remain of that opinion until something simpler and safer be introduced.

I have found it necessary to make frequent reference to the lorries or carts which do all the work of carrying freight through the streets. These are usually flat, and substantially built, and have no sides or ends beyond the few inches of sill to keep the load from slipping off. They are mounted on four strong wheels, which have often a tread of 6 in. in width, and weigh altogether from 15 to 36 cwt., as the load they are constructed to carry varies from 3 tons to 14 tons.

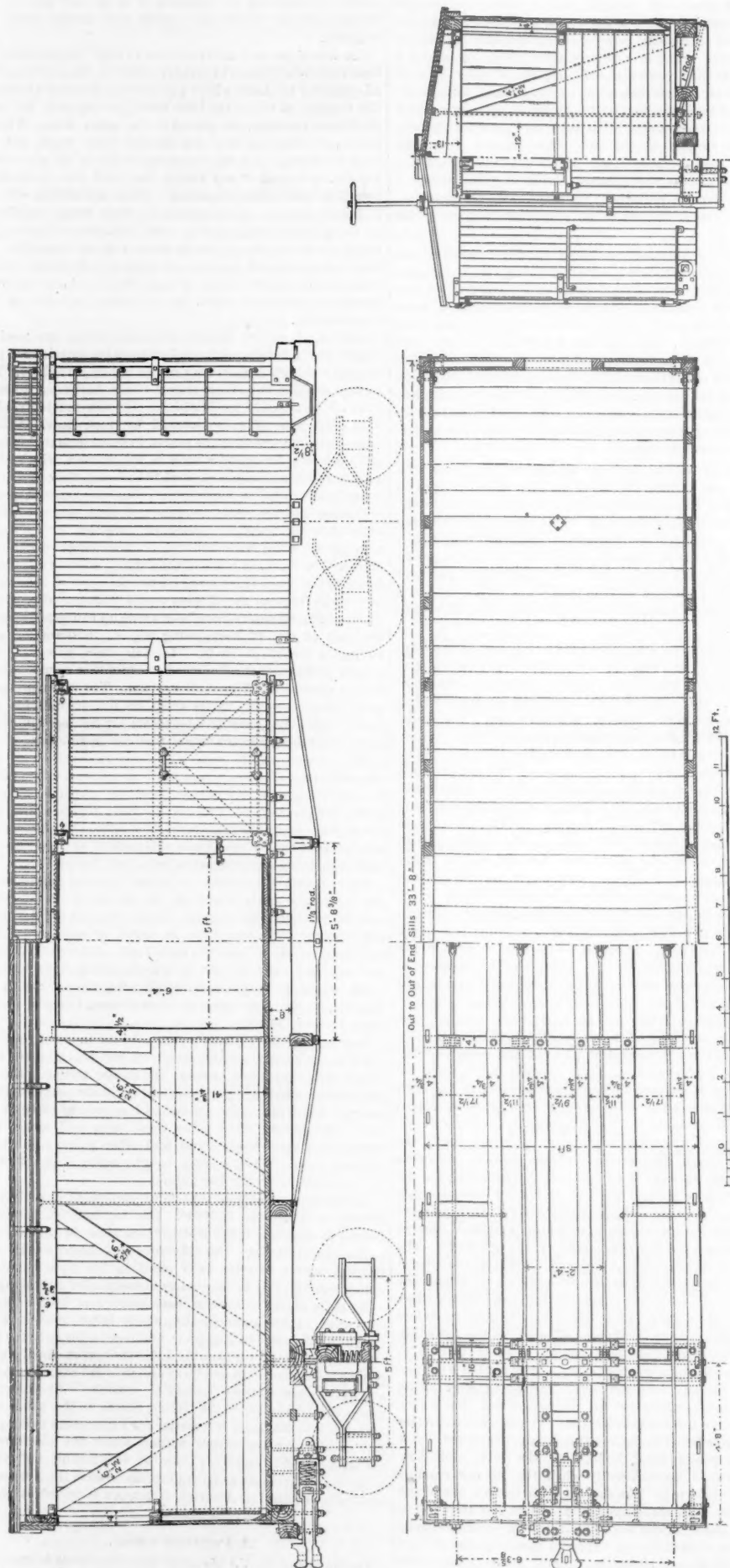
Similar wagons, with sides and ends, are in use on rougher roads in the country, which weigh as much as 23 cwt., and which will carry 3 tons of coal. The lighter freight traffic of the streets is carried in two-wheel carts usually made without springs, which are often loaded with as much as 30 cwt. of coal. The horses which draw these carts and lorries are usually of a very heavy build, and often weigh as much as 16 cwt. each. When a horse weighs more than 19 cwt. he is considered a very fine animal.

It will thus be noticed that in the streets, as in the warehouses, and on the railroads, the methods of handling freight in England differ widely from those in general use in the United States. The difference lies chiefly in the substantial nature of the fixed plant in the older country, which is due largely to the greater abundance of capital there.

My main object in writing these letters has been to indicate some of the methods by which large quantities of freight are handled in England; and more especially the aid which hydraulic power has afforded in the operations of transferring it between ship and lorry and railroad-car, as rapidly and at the same time as cheaply as possible. Whether this power can be applied in the United States to the same extent as it is in England, is a matter for experiment to decide. But considering the severe winters which the machinery has already safely endured, I see no insuperable difficulty in the way of its more general adoption, even in the Northern and Eastern states of America. EDGAR WORTHINGTON.

A Peculiar Gang.

The Newburg (N. Y.) Journal says that there is one coal train gang on the Erie road who are easily distinguished at any distance. It is that of Conductor Clay, running between Newburg and Port Jervis. Every one of them wears a glossy black plug hat, of an antiquated style, and having unusual height. These cover their heads in winter or summer, sunshine or rain, and an odd sight do the gang present. Below the plug hat each man is usually encased in overalls, grimy with the dirt of the coal train, and a clay pipe seems inseparable from his mouth. To see them burrowing over the cars, applying the brakes, or lounging in the caboose, the stove pipe always on their heads, is equally ludicrous.



BOX CAR FOR THE NORTHERN PACIFIC RAILROAD.
Built by the PENINSULAR CAR WORKS, Detroit, Michigan.

Box-Car for the Northern Pacific Railroad.

The engraving published this week represents a box-car built by the Peninsular Car Works of Detroit, Mich., for the Northern Pacific Railroad, and exhibited at the Chicago Exposition of Railway Appliances. The specifications from which this car was built are given in full as follows:

GENERAL DESCRIPTION OF NORTHERN PACIFIC STANDARD BOX-CAR.

Length outside of end sills.....	33 ft. 8 in.
Width " side ".....	8 " 0 "
" inside of inside lining.....	7 " 5 1/2 "
Height, bottom of sill to top of plate.....	7 " 0 "
" top of sill to under side of plate.....	6 " 4 "
" top of floor to top of girt.....	3 " 4 "
" under side of carline.....	6 " 5 1/2 "
Centre, intermediate and side sills of Norway.....	4 1/2 in. x 8 in.
Side plate of Norway.....	3 1/2 " x 6 "
Ridge pole, of oak.....	2 1/2 " x 4 "
Roof ribs, 4 in number, of oak.....	1 1/2 " x 2 1/4 "
End sills of oak.....	5 1/2 " x 8 "
Cross ties of oak.....	4 " x 8 "
Draftwoods of oak.....	4 1/2 " x 8 1/4 "
Body transoms of oak.....	5 " x 10 "
Side door posts of oak.....	4 1/2 " x 4 1/2 "
Corner posts of oak.....	4 " x 4 1/2 "
End posts of oak.....	3 1/2 " x 4 1/2 "
Intermediate posts of oak.....	3 1/2 " x 4 "
Side and corner braces of oak.....	2 1/2 " x 6 "
End braces of oak.....	2 1/2 " x 4 "
Side and end girts of oak.....	3 " x 3 1/2 "
End plates of oak.....	2 1/4 " x 13 "
Carlines, 7 in number, of oak.....	1 1/4 " x 10 1/2 "

Flooring of Norway, 1 1/2 in. thick, ship-lapped, secured to sills by three 20d. cut nails through each board at each cross-ing.

Outside sheathing of white pine, planed on both sides, tongued and grooved and centre beaded.

Inside lining of Norway, extending from underside of girts to within 2 in. of floor, the angle at floor and outside sheathing covered by a base board of white pine placed at an angle of 60°.

Roof, double boarded of white pine, tongued and grooved, each board of first course secured to plate, roof ribs and ridge pole by two 2 in. No. 9 P tarbed nails, each board of second course secured in same manner as first course by two 2 1/2 in. No. 9 P barbed nails to each board.

Roof ribs and ridge pole secured to end plates and carlines by 3 1/4 in. No. 6 P barbed nails.

Running boards of pine in three widths of 5 in. each, 1/2 in. apart, running full length of car, the centre piece 1 1/2 in. thick, shaped to fit hip of roof and secured to ridge pole and end plates by 4 in. No. 6 P barbed nails, outside boards 1 in. thick secured to cleats by 2 in. No. 9 P barbed nails.

Batten side doors, frame of ash, 5 ft. 4 in. wide by 6 ft. 4 in. long, 1 1/2 in. thick, batten end doors, one at each end, frame of ash, 2 ft. 4 in. wide by 3 ft. 1 in. long.

Body transoms extend across the full width of the car and are secured to sills by 3/4 in. bolts. Transoms are trussed by three 1 in. rods secured to 3 x 3/4 in. straps passing over centre sills, straps having a pocket formed at each end to receive nuts on ends of rod, rods having square heads on outside ends bearing against wrought washer plates on end of transoms.

Scaffold draw bar with 4 x 1 in. tail strap, 1 in. followers, 2 x 3/4 in. follower guide strap secured to draftings by 3/4 in. bolts passing through lugs and top and bottom straps. Drawbar springs 6 x 6 in. coil round bar 1 1/2 in. and 3/4 in.

Body truss rods, 4 in number, 1 1/2 in. dia. with 1 1/2 in. ends, with knuckle joints in center of each rod and provided with cast iron saddles at cross ties and transom truss blocks.

Framing rods, 5/8 in., 20 in number, passing through plates, by edge of posts in grooves made to receive them, and through side and end sills, one rod to each door post, transom post, corner post, centre intermediate post and end post.

Centre pins, 1 1/4 in. dia., with solid round beads resting on centre truss plate, which is swelled out to allow pin to pass through.

Corners of the car have at the plate corner plates, 2 x 1/4 in., extending 9 in. each way, and inside corner plates, 2 x 1/4 in., secured by 3/4 in. bolts, passing through outside corner plates, side and end plates, and inside corner plates, at the girt inside and outside corner plates secured in a similar manner, at the sills corner plates, 8 x 1/4 in., secured by two 3/4 in. bolts to each sill.

Carry irons, 3 x 3/4 in. one extended so as to form step for brake mast; brake mast 1 1/2 in. with 1 1/2 in. swell.

Brake beams are fitted with cast iron brake heads and shoes, secured to beams by 3/4 in. bolts and suspenders by 3/4 in. iron stirrup hangers, with hook at the ends attached to 3/4 in. eye bolts passing through brake hanger blocks and end sills. Two safety chains of 3/4 in. run to each beam and two 3/4 in. wheel guards.

Brake lever 3 x 3/4 in., top connection 3/4 in. round, bottom connection 3/4 in. round with 2 x 3/4 in. jaw. Link of 1 1/4 x 1 1/2 in. round iron and coupling pins 2 x 1 in. section.

Ridge of roof under running board is protected by a strip of tin running full length of car.

Swing-motion trucks, Northern Pacific standard pattern.

Truck transoms of oak.....	4 1/2 in. x 12 in.
Bolsters.....	7 1/2 " x 11 1/4 "
Spring plank.....	3 " x 14 "
Brake beams.....	3 3/4 " x 7 "

Arch bars and inverted arch bars, 3 x 1 1/2 in.; pedestal tie bars, 3 x 3/4 in. Bolster hangers, 1 1/2 x 3/4 in., enlarged at bottom to 1 1/2 in. thick. Top bolster axles, 1 1/2 in. round; bottom axles, 3 1/2 x 2 in., drawn down to 2 in. dia. Secured to spring plank by two 3/4 in. bolts to each axle.

Check chains of 5/8 in. short-link chain, attached to eye bolt at each corner of truck and hung to plate hooks bolted to side sills by 3/4 in. bolts.

Axles, Master Car-Builders' standard. Brasses, Master Car-Builders' standard, lend lined.

Wheel, 33 in. dia., 550 lbs. each.

Bolster springs, 8 x 7 in., 2 coil; outside coil, 1 1/8 in. x 1 1/8 in.; inside coil 1 1/8 in. round.

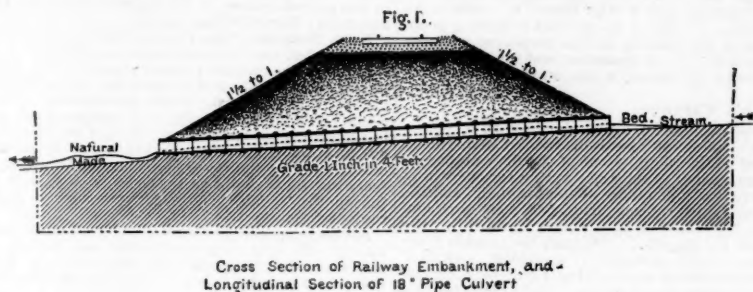
Sewer Pipe for Culverts Under Railroads.

In the construction of railroads where good building stone is scarce, or not to be had at any price, as in many parts of the West and South, there are a great many places where small streams have to be crossed, where it becomes desirable or necessary to provide a substitute for stone masonry for culverts. This substitute has usually been a box culvert of timber (which is objectionable under any embankment, and wholly inadmissible under a high one), or a timber trestle of some sort. In the early days of railroad building vertical timber walls, or abutments, were built, with timber stringers across on top, to support the track; but these are now uniformly abandoned by modern engineers, and a trestle of timber bents or piers, resting on timber sills, or (and much better) a pile trestle, has been substituted. But there are many small openings necessary, where any form of timber trestle is unneces-

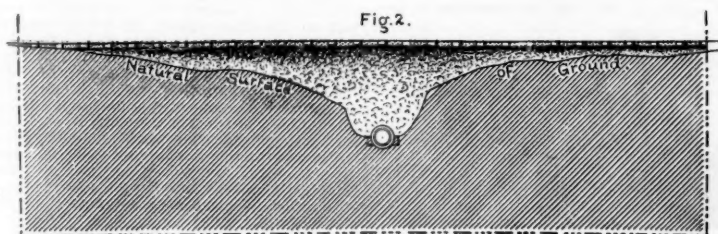
sarily large and expensive, where some other kind of structure, less expensive and more durable is desirable. In many such places a small pipe is ample to pass the water under the roadway. In some cases iron pipes have been used, but they are not usually economical in cost, and a cheaper and equally durable substitute has been looked for.

in no instance in his experience with it has this pipe, where properly laid, failed to give entire satisfaction, and that there is no doubt of its durability and strength, and that he does not hesitate to use it under embankments of any height.

The pipe should be laid with care and so as to have a uni-

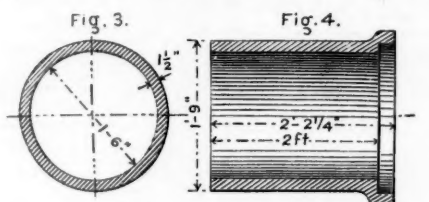


Cross Section of Railway Embankment, and Longitudinal Section of 18 inch Pipe Culvert

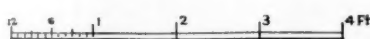


Sewer pipes, made of cement, have been tried in the West, but these proved defective, in that it was found they did not withstand the freezing of our severe winters.

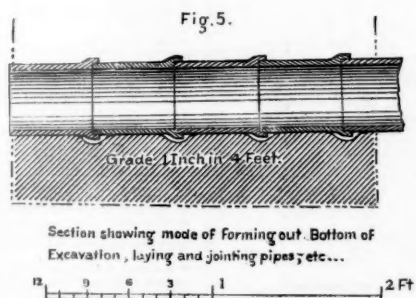
The next pipe tried was the ordinary clay pipe, made for street sewers. As usually made these proved not to be sufficiently heavy and strong. In 1877 the Sewer Commissioner of St. Louis, finding that the pipe in use in that city was not sufficiently heavy and strong, required the manufacturers of pipe for future use in his department, to increase the thickness and consequent strength of their pipe, specifying



Cross Section and Longitudinal Section of an 18 inch Culvert Pipe.



Weight per foot of run of Pipe = 100 lbs.



ing that thereafter the pipe made for that department should have a thickness equal to one-twelfth of its diameter, and should be made of good fire-clay, well worked, and well burned and vitrified.

A pipe of the kind required by these specifications was accordingly made by the St. Louis manufacturers, and especially by Messrs. Blackmer & Post, who are large manufacturers of pipe in that city.

This pipe of increased thickness and weight was tried for culverts under railroads, among the first, by Col. H. C. Moore, Civil Engineer, in the construction of the Eastern Division (east of the Wabash River) of the Indianapolis, Decatur & Springfield Railroad in 1879, where over 5,600 lineal feet of sizes of 12 to 18 in. was used. This gave such satisfaction that, in the construction of the Indiana, Bloomington & Western Railway from Indianapolis to Springfield, O., by the same engineer, in 1881 and 1882, the same pipe, made by the same manufacturers, was used for small culverts to the amount of over 10,000 lineal feet, and so far, with the same satisfactory results. Col. Moore certifies that

form bearing on the bottom on which it is laid, cutting the excavation in the solid earth to conform exactly to the curve of the outside diameter of the pipe and flanges, to give it a solid and uniform bearing. Then the joints should be carefully and well filled all round with good hydraulic cement. When thus laid, the embankment should be carefully packed about the sides of the pipe.

No parapet walls of any sort are used in his practice, and in no case has any damage arisen from their omission; but where, for any reason, they may be thought necessary, they can of course be used. His practice has been to use no pipe over 18 in. in diameter, but other engineers have used them of 21 and 24 in. diameter. These larger sizes have been largely used on the Texas & Pacific and on the New Orleans & Northeastern and other Southern roads. Col. Moore says he prefers, where one pipe of 15 or 18 in. is not sufficiently large for the water to be discharged, to use an increased number of pipes laid side by side, rather than to use pipes of larger diameter.

The accompanying drawings will illustrate the method of laying these pipes, recommended as necessary and proper to make a durable, safe and cheap culvert under any railroad.

Fig. 1 is a cross section of an embankment 10 ft. high, showing a longitudinal section of culvert laid under the embankment; fig. 2 is a longitudinal section of railway embankment and cross section of end of pipe; fig. 3 is a cross section of end of 18 in. pipe; fig. 4 a longitudinal section of one joint of pipe, and fig. 5 a section showing mode of forming bottom of excavation for pipe, and laying and jointing the pipes together. The weight per lineal foot of 18 in. pipe is 100 lbs.

The following instructions for laying culvert pipe is copied from the catalogue of Messrs. Blackmer & Post:

HOW TO LAY CULVERT PIPE.

If you have never used any kind of pipe for culverts, we may be able to give you some ideas that will be of service to you in laying our culvert pipe, and enable you to secure the best and most permanent service from it. The too common way of doing it has been to dig a trench, put the pipe in carelessly, and cover it up. This is wrong. The bottom of the trench should be rounded out to fit, as nearly as possible, the body of the pipe from the lower surface up to the horizontal center line; then cut little depressions in the bottom of the trench to fit the sockets, so that when the pipe is laid, its entire lower surface, from end to end, will rest solidly on the ground (see figs. 6, 7 and 8). When the ground is soft or sandy this cannot be done, but the same result may be

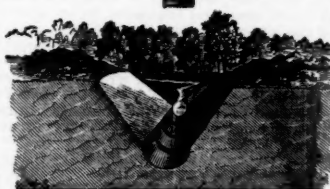


Fig. 6.

Obtained by carefully ramming the loose earth under and around the lower surface of the pipe, after they are placed in position. When this is done properly it is a matter of no consequence how high the bank is above the pipe, for it cannot be broken by the weight of the earth. If the face of the bank is solid, and not likely to cave or slide, the end pipes need no protection other than to secure a firm rest for their lower



Fig. 7.

surface. Sometimes the earth will be found hard enough to obtain this without other protection, if not, then a foundation of brick, stone or cement should be made to receive the end of the pipe and extended up to the center line of the pipe (see fig. 9). If, however, from heavy rains or overflows, the bank is liable to be undermined, then this parapet wall should be extended up high enough to give the desired protection. The joints should be put together with good cement, plenty of it, and not much sand in the mixture; care should also be taken that the inside of each joint is scraped out when cemented, in order that no loose cement be left projecting into the pipe, which, when it hardens, will help to check the discharge.

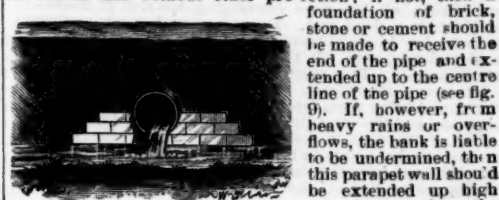


Fig. 8.

In northern latitudes, where severe cold prevails, the culvert should have a good fall, and be so constructed that it will drain itself (see fig. 9); for if the pipe is allowed to stand partly full of water, as would be the case where the outlet of the culvert was so low as to admit of back-water (see fig. 10), the expansion of the water in freezing will burst the pipe as certainly as it would burst an iron pipe or a solid rock.

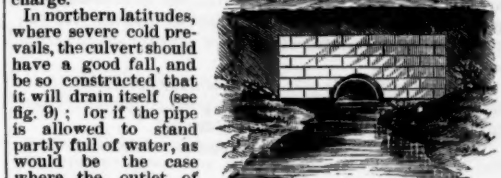


Fig. 9.

When the capacity of one pipe is not sufficient, two or more may be laid side by side, as shown in fig. 11. This

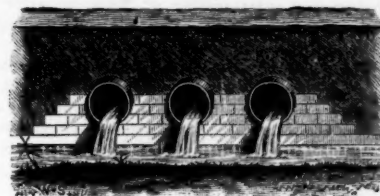


Fig. 10.

practice is quite common, and there is an advantage in it, in that the water would not need to rise so high to utilize the full capacity of the pipes, but they should be placed far enough apart to secure a solid bed for each pipe. In our illustrations we have shown only the outlet of the culvert, but it will be understood that both ends need the same protection.

Of course no arbitrary rules can be formulated for such work as this, but we have aimed to give, in a general way, the main points to be considered, necessarily leaving much to the discretion and judgment of the engineer in charge of the work.

Culverts made of this pipe are said to be as durable and reliable as culverts of the same capacity made of iron or stone, and very much cheaper than either. They are also more durable and cheaper than culverts or trestles made of timber.

Any further information with reference to the use of such pipe may be obtained of Messrs. Blackmer & Post, manufacturers of it, No. 714 Pine street, St. Louis, Missouri.

The Mersey Tunnel.

On either bank of the Mersey—at George's Dock on the Liverpool side, at Woodside Ferry on the Birkenhead side—are now to be seen vast works which in outward appearance have a close resemblance to the surface apparatus of a coal pit. There are stupendous pumps pouring forth enormous streams of water, and there are winding wheels, erected on stages high in the air, bringing to the surface great barrows of waste. The solemn plunge of the pumps and the rapid whirr of the winding gear go on day and night without rest or intermission. The stream of water is poured into the river; the waste is loaded into carts or barges and carried away no one knows whither. This process has been in active and unbroken operation for many months, and besides powerful steam engines, over 800 men are busily employed in the work. But, though the arrangements have some similarity to those of a coal pit, the energies of the workers are not devoted to the winning of coal or other valuable products of the earth. They are directed to the boring of a railway tunnel under the deep bed of the Mersey, and the process is being conducted simultaneously from both sides of the river. The engineers have mapped out their lines of advance, and the excavation is being pushed forward from the Lancashire and the Cheshire sides in full assurance that the borings will join in the middle of the river, and that the perforation will be completed for the use of railway trains at no great distance of time. Judged merely by length, the projected tunnel is one of comparative insignificance: at the point where it is being made the river is scarcely a mile in breadth, but this would be a fallacious standard by which to measure its difficulties and its importance. The engineering difficulties are very serious, and though boldness, skill and patient work are overcoming them, it would be unfair to underrate their gravity. The Mersey is a river of great depth, and, of course, the tunnel has to be sunk to a proportionate level. The geological formation of the bed is also a difficulty, consisting as it does of the new red sandstone stratum. The whole tunnel has to be pierced through this rock, which itself is a heavy work, and there

is always the contingency of a "fault" occurring in the formation, through which fissure the waters of the river overhead might flow in. Fortunately, no such danger has been encountered, and ample precautions are taken against its occurrence. Of course, much water leaks into the workings through the porous sandstone, yet less than was anticipated by the originators of the scheme, and no more than the pumps can lift out without exerting their full power. The engineering difficulties are thus being steadily overcome, and the work proceeds with a rapidity that was scarcely hoped for. And the economic results of the enterprise when completed will be of commensurate value. At present Liverpool is practically cut off from railway communication with Cheshire and Wales; all the lines converging toward Birkenhead terminate in a dead end. Passengers and goods arriving en route for Liverpool must be ferried across the Mersey in steamboats, with all the attendant cost and delay of transshipment. The tunnel will constitute a connecting link between the railway systems of the trans-Mersey territory, and bring them into unbroken communication with Liverpool and the spreading network of Lancashire lines. Thus, if the work is difficult and expensive, the reward promises to be great, and in this fact may no doubt be found the real incentive to the energy with which the work is being prosecuted.—*London Times*.

Blake's Improved Locomotive Feed Pump.

The accompanying engraving illustrates a very compact boiler-feed pump of independent vertical form, especially adapted for use on locomotives. The pump is of the double-acting piston pattern, with a very simple yet positive arrangement of steam valves. Having no dead centre, the pump can travel at slow speed when so desired. At full speed the pump operates with perfect smoothness and without noise or jar.

Practical tests, it is said, have demonstrated that these improved locomotive pumps effect a great saving of fuel over injectors and similar boiler-feeding devices.

They are constructed with composition piston rods, stuffing boxes, valve seats, valve bolts, and water cylinder linings. The water pistons are also made of composition, and are suitably packed with adjustable packing. All parts are interchangeable, and can therefore be readily duplicated in case of accidental breakage or unusual wear.

These pumps have large direct water passages and full valve areas, which not only reduce water friction to a minimum, but prevent any pounding or thumping while working. A suitable flange on the back of the pump admits of a firm bolting in the position desired.

These pumps can be placed in any convenient position on a locomotive, but are usually located under the foot-board in a similar position to the air-brake pump, only on the other side of the locomotive. They are made in three sizes, the dimensions of the smallest size being only 10 x 8 in. wide and 26 in. high over all, while the largest size is but 11 x 10 in. wide and 44 in. high.

A very convenient hand-power attachment is provided with each size, so that when necessary (after blowing off boilers) the pump can be operated by hand power.

These pumps are also used in small steam yachts and launches, being bolted directly to the boilers. All the government steam launches are provided with these pumps, the Navy Department having adopted them. They are made by the Geo. F. Blake Manufacturing Co., New York and Boston.

THE SCRAP HEAP.

The Electric Exhibition in Vienna.

The Electrical Exhibition was opened on Aug. 16 in the great rotunda in the Prater, the beautiful edifice which has been preserved as a memento of the Vienna Universal Exhibition of 1873. The weather was gloomy and rainy, but a large concourse of foreign and Austrian visitors was present at the ceremony. The President of the Exhibition first addressed the Crown Prince, thanking the Government for its support of the undertaking. The Crown Prince, in reply, said that the object of the Exhibition was to promote the utilization of a mighty natural force by means of scientific labor, and particularly to further its employment for the ordinary purposes of daily life. It was from Vienna, continued his Imperial Highness, that the invention of the lucifer match went forth, and also that of the stearine candle. The use of gas for lighting the streets was proposed in Vienna by a certain Zinner, and carried out in England. The Viennese were not, therefore, occupying new ground in the history of the development of the means of illumination.

The Boldest Railway Yet Constructed.

The Swiss correspondent of the *London Times* telegraphs under date of Aug. 17:

"I have just made, by special favor, an excursion by the funicular railway, at Territet, near Montreux, which ascends the Vaudois Righi, and which will be open on Sunday next to the public. This railway is the boldest work of the kind which has yet been attempted. The gradient is three in five. The journey, which consists of an ascent of 304 metres (the horizontal distance being 500 metres) was effected in seven minutes. The carriages, which are so constructed as to permit passengers to preserve their sitting posture, have each three brakes, an automatic, a pneumatic, and an ordinary one. To-day's trial was made by the Swiss government engineers, who made two journeys by the railway. One carriage ascends as the other descends.

"A more splendid view than that of the Lake of Geneva and the surrounding scenery from the summit attained by the railway cannot be imagined. Even, however, with the conviction of perfect safety, travelers will not fail to experience a natural shudder at traversing a line now carried over steep precipices, and now drawn along the very verge of them. Tourists, however, should not omit to make this little excursion, for nowhere else can they enjoy such a spectacle. The success of the undertaking is now certain, and it will certainly be imitated. The new line leads to one of the most picturesque points in Switzerland, and will doubtless be much appreciated by the English, for whom Montreux and its environs are a favorite winter resort."

Cast-Steel Driving-Wheels.

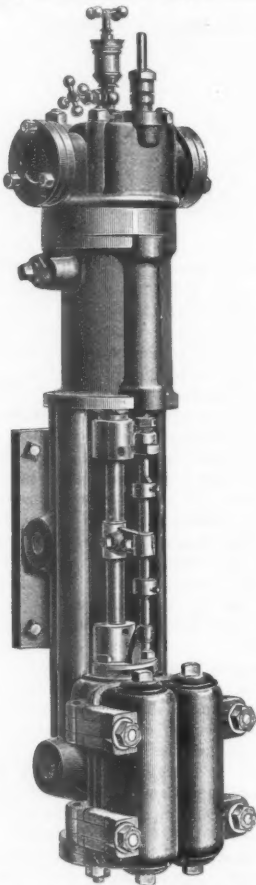
At a meeting of the English Institution of Civil Engineers, held last March, Mr. F. W. Webb exhibited a specimen of what he termed liquid forging in steel, which was a step in advance of stamping. It was a driving-wheel for a locomotive, weighing about 8 cwt., cast in a revolving table driven by a Brotherhood three-cylinder hydraulic capstan engine. The mold revolved 40 times a minute during the whole time of casting. He stated that he had made about 200 wheels in that way, and they had turned out perfectly sound for every practical purpose. He exhibited samples of the turnings, showing that the material was mild steel, containing about 1/2 per cent. of carbon. He had one broken up for the purpose of testing, and it was found to contain no excess of phosphorus or silicon to prevent it forging properly. At the time of the meeting he was preparing patterns for casting wheels 6 ft. 6 in. in diameter, and said that there would be no difficulty in casting a tire on the wheel, if desired.

The Brakeman's Partner.

A brakeman who attended a social dance with a young lady in tow some evenings since was discovered sitting lonesomely in a corner of the room by one of the floor managers late in the evening, just as a set was forming for the "next quadrille." There was "one more couple wanted," and the floor manager sang out, "Come, Bill, get your girl and chaisez into place." "Can't do it this time," said Bill, "the girl's side-tracked for repairs." "What's the trouble?" inquired the other, with concern, "anything serious?" "Dunno," the railroader answered, "but I guess she's tryin' to get a misplaced switch into position. We'll make the run if she gets here on schedule time, you bet!" The girl got there, and all went merry as a locomotive belle for the brakeman and his girl the rest of the evening.—*Marquette Mining Journal*.

A Chance for a Dress Suit in a Locomotive Cab.

Chicago has an ordinance requiring locomotives and tugs not to make any smoke in the city, or something to that



BLAKE'S IMPROVED VERTICAL STEAM PUMP.

effect. The result has been much trying of smoke-consuming appliances. The *Chicago Tribune* says:

"Unless some one of them is soon adopted there will be such an endless variety of smoke-consumers in the market very soon that it will be considered vulgar to have one. The fact that none is adopted does not seem to annoy the inventor. Every day one pops to the surface. Every day the Secretary of the Citizens' Association is startled by the rap of an inventor who, upon entering, looks about suspiciously, pulls a smoke-consumer out of his pocket, draws nigh to the Secretary, and whispers that he has got the very thing at last which every tugman and engineer wants. One of the latest was reported yesterday. It consists of a pan in which a certain amount of crude oil is placed, and this is brought in some sort of contact with the surface. The inventor didn't stop to say just how, but the point he desired to make was this: that the man who operated it could wear white kid gloves, a white vest, and a white necktie, and put a Brussels carpet on the floor about the boiler; that the smoke would be so entirely consumed that the man could go from his duties as an engineer or fireman to the ball-room without having to stop to change his toilet.

"This would seem upon the face of it to be the consumer which the city and the firemen and engineers have been in search of. Most of the latter have but one suit, and that is a dress suit. This has often militated against their accepting positions of labor, but now that there is a chance for a man to fire a tug in a claw-hammer coat, with white glove and necktie attachments, there will no doubt be a rush for places and a boom created for the latest smoke-consumer which will skyrocket its stock and bankrupt every former device."

Experiment with Boiler Evaporation.

Mr. W. T. Peoples, General Master Mechanic of the Manhattan Elevated Railway, has been engaged in a series of interesting experiments to test the evaporative service of boilers under varied conditions. The methods of investigation which he followed were in some instances quite unique.

A locomotive boiler employed to supply steam for driving part of the machinery at the repair shops was not evaporating so much water for the coal consumed as was considered desirable. J. D. Campbell, Foreman of the works, who directed the experiments, believed that the flues were too numerous for efficient evaporation. He kept a record of

the fuel used and the water evaporated in the ordinary working of the boiler, and ascertained that 6 1/2 lbs. of water was evaporated for each pound of coal. While the boiler was doing this work, a vessel containing one gallon of water was placed in the fire-box and the water evaporated in 7 minutes and 2 seconds. The vessel was again filled and put into the smoke-box, where the water evaporated in 38 minutes. This experiment was repeatedly tried, and the mean of the periods taken to evaporate the water did not vary materially from the time given.

Forty flues were then plugged throughout the centre part of the boiler, and the experiments repeated. It was now found that the gallon of water placed in the fire-box evaporated in 5 minutes and 45 seconds, while it took 60 minutes for it to evaporate in the smoke-box. This showed a remarkable increase of fire-box temperature, and decrease in the heat of the smoke-box. Under the last conditions the evaporation of water rose to 8 1/2 lbs. of water to the pound of coal. These figures are curious and startling. We would feel disposed to doubt their accuracy were they not made by thoroughly reliable engineers, who know perfectly what they are about.

Several experiments were made where tin, lead and antimony, with their compounds, were used to find the fire-box and smoke-box temperatures, but they did not act so reliably as the water vessel.—*American Machinist*.

Names.

Mooselucmaguntic and Jocknahmakantajus are to be stations on a projected railroad in Maine. These are evidently the names which prophetic brakemen have been shouting in at car doors all over the country, but which weary travelers have never been able to distinguish by ear.

Not much fault can be found with the Pennsylvania Railroad station in Jersey City, but sensitive passengers do object to the employment by the company of a fiend whose sole business seems to be to stand at the head of the ferry slips and shout "Hyops-sud-d" in a terrifying bass voice. Imaginative persons have thought that he was advising them to hurry up if they wished to catch the next boat, but no ordinary ear can convert his unmelodious howl into any intelligible words. The company is, perhaps, not responsible for another fiend, who stands in the ferry-house and draws out in a peculiarly harsh tenor voice something like "Bundle-nex-sway," and who is supposed to have some remote reference to the Brooklyn Annex ferry by other travelers with sufficient imagination to supply words to his monotonous chant.

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Georgia.

This company owns a line from Augusta, Ga., to Atlanta, 171 miles, with branches from Camak to Macon, 78 miles; Barnett to Washington, 18 miles; Union Point to Athens, 41 1/2 miles; a total of 308 1/2 miles. The road is leased, the Central, of Georgia, and the Louisville & Nashville companies holding the lease jointly. The report for the year ending March 31 is made by the General Manager to the lessees.

During the year the Athens Branch was extended 1 1/2 miles to a better terminus in Athens, the extension not being opened until February.

The equipment consists of 43 locomotives; 28 passenger, 6 sleeping, 5 combination, 3 postal and 9 baggage cars; 447 box, 153 Green Line box, 26 stock, 106 coal, 182 flat and 19 caboose cars; 1 pay car, 3 commissary and 29 shanty cars.

The freight traffic is reported as follows:

1882-83.	1881-82.	Inc. or Dec. P. c.
Bales cotton.....293,480	254,760	I. 38,720 15.2
Bushels grain.....1,826,167	2,638,090	D. 812,523 30.8
Barrels flour.....223,856	204,775	I. 19,081 9.3
Tons fertilizers.....54,943	51,289	I. 3,657 7.2
Total tons freight.....235,537	344,579	I. 11,042 3.2
Total miles.....46,509,431	45,705,074	I. 804,357 1.8
Receipts per ton-mile.....2.05 cts.	2.07 cts.	D. 0.02 ct. 0.9

The total mileage run by locomotives was 1,178,068



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EDITORIAL ANNOUNCEMENTS.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

VALUE OF ELEMENTARY SCIENCE TO PRACTICAL MEN.

In an article on "Physical Science in Relation to Architecture," by Mr. J. Slater, recently published in *The Builder*, that writer, in discussing the value to an architect of a knowledge of scientific subjects, says:

"My point is, that a slight acquaintance with these subjects is much better than none at all. As was pointed out by Dr. Siemens some few months ago, a little knowledge is not a dangerous thing under certain conditions; these are that the little knowledge be well digested, and that its limits be kept always clearly in view. Although it may seem paradoxical to say so, yet it is a fact that a little knowledge of a subject will often enable a man to see clearly that he knows nothing at all about certain branches of that subject; whereas, if he had no knowledge at all, he might think he knew all about it."

These remarks will apply to practical railroad men, to mechanics and inventors, as well as to architects. It is not easy for a person whose education began in the early days of his childhood, and who ever since has been accustomed to the constant use and companionship of books, to understand the condition of mind of a naturally intelligent person, whose education was of the most limited kind in early life, and who has acquired little or no knowledge then or since that time from books. One marked peculiarity in such people is that what they have learned from their own observation and experience has an entirely different character to them from that knowledge which has been or may be acquired from books. Probably no amount of printed testimony in the form of records of tests of the tensile strength of bar iron, no matter who the experiments were made by, would be regarded by such people with anything like the confidence that a rude test of their own would be. The facts and the theories which are to be found in books and other publications have to them somewhat the character of a myth, with perhaps a thread or substratum of truth interwoven or underlying it, but which is mixed up with what is so vague and to them incapable of clear apprehension that they are not willing to give it much credence. The difficulty with them seems to be that their education has been acquired almost entirely through object lessons—the objects being the things of everyday life with which they have been brought into contact. They are not able to think without these objects as symbols or characters to represent their thoughts. They have never acquired the power of mental abstraction which the study and use of books gives, and, consequently, their thinking is confined within comparatively narrow limits. To illustrate what is meant, it is not difficult

to convince any practical mechanic that the longer a crowbar is the more power can be exerted by it; but if you advance the theory that the leverage of the reversing mechanism of a locomotive is indicated by the amount of the throw of the upper end of the reverse-lever, your conclusions will not be so readily accepted.

Sometimes ignorance of elementary science manifests itself in amusing ways, or it results in great waste of money, and at other times in melancholy disaster. That railroad men would be very much more efficient in the performance of their duties if they had some elementary scientific knowledge, there is not much room to doubt. If it were possible to keep a record of the mistakes which are made about a great railroad, and which are due to a lack of knowledge of the elements of science, it would no doubt be very entertaining.

An amusing case was one, which has we believe been quoted in these pages before, of a foreman of a machine shop who proposed to increase the power of a condensing engine by putting a large button or knob on the back of the piston "for the vacuum to take hold of."

One of the great difficulties in the way of ventilation of both buildings and cars is the almost universal ignorance of the laws of the flow of liquids and gases. There is an impression that by simply putting a hole in the top of an apartment the impure air will pass out, and after having made such an opening many mechanics feel that they have done all that can be or need be done to secure good ventilation.

It is curious, too, how an error of this kind will make itself impregnable. It might be supposed that it would be somewhat of the nature of a mental mist which a little commotion in the atmosphere of discussion would blow away. On the contrary, it seems to have the weight and the solidity of a boulder, and to sink down into the soil by its own inertia. Time, rain and frost all seem to help it to imbed itself and hold its place, and nothing but some powerful convulsion can wrench it from its position.

Besides the mere lack of the elementary principles of science, there is often found a curious kind of incapacity for believing what to a right-minded person is obviously true. Proof and testimony seem to have no weight with such people. The mental defect is one which, it is believed, is much more common than is often supposed. It is not mere inability to reason correctly on given premises, although that is very common. The writer is acquainted with a man of very astute mind who said that he never could advance far in mathematics, because he was not able to convince himself of the truth of the axioms, postulates and corollaries which he was required to accept. It seems probable that there are other people—more than is supposed—who in matters pertaining to things besides mathematics will not believe that "things which are equal to the same thing are equal to each other," or that "the shortest distance between two points is a straight line."

This mental trait was curiously illustrated in the narrow-gauge discussion some years ago. With a great flourish of trumpets it was announced by the advocates of that system that cars and locomotives of the same carrying capacity for the narrow gauge would weigh and cost less than for the standard gauge. The reasons were pointed out why this could not be so, but had little effect apparently. Then written statements from the most prominent manufacturers of both locomotives and cars, saying that neither the cost nor the weight was materially less, were published; yet many of the advocates went on repeating their old formula, apparently unconscious that there was any evidence to the contrary. The same thing was true of the weight of rails and the radius of curvature of the track. Over and over again it was asserted that shorter curves could be operated with the narrow gauge than with the wide. It was clearly shown that the cause to which this was attributed had an almost inappreciable effect. After the discussion had been carried on for several years the elevated roads in New York were built, and more trains were run over them than over any other railroad in the world, and these trains are still running over shorter curves (90 ft. radius) than are in use on narrow-gauge railroads. Even then the statement that shorter curves could be used on the narrow gauge than on a standard gauge road was still repeated about as often as before, although it must be said that about this time the narrow-gauge theory could not find any supporters among engineers of distinction. The curious fact, though, was that the evidence brought forward to disprove the truth of the narrow-gauge premises seemed to have no effect whatever on many persons who apparently had no reason for being interested or prejudiced the other way. Like our non-

mathematical friend, they could not believe in the axioms or corollaries.

Of mistakes which are made from a lack of knowledge of elementary science, a long list might be made. Most of our readers remember the Fontaine locomotive, on which so much money was wasted, all of which would have been saved if the projectors had been equipped with a very limited amount of knowledge of the principles of mechanics.

The Shaw locomotive is an illustration rather of a lack of capacity for estimating the value of the advantages gained. There can be no doubt of the fact that the engine is balanced more perfectly than an ordinary engine is, but the advantage gained is not worth what it costs. If it were, there are no simpler methods of accomplishing the object aimed at.

The Holland hydrogen gas engine is always about to do some wonderful thing. This does not alter the fact that there is more heat in a dollar's worth of coal than there is in a dollar's worth of petroleum, which has been shown over and over again.

Another amusing instance, of the result of a lack of knowledge of scientific or mechanical principles is the Murphy locomotive, illustrated on another page. This engine was patented, and the owners of the patent entertained high hopes of its success. As will be seen from the explanation accompanying the engravings, such an engine would not be able to turn its own wheels. The parties interested were very indignant when this fact was pointed out to them. The inventor, it was said, is a "practical" engineer. Unfortunately, he is not a theoretical engineer, and he overlooked some important elements in his mechanism.

In the cases cited, a very little elementary knowledge of science would have prevented the persons from falling into the errors they did. Those cases are obvious and palpable. They have come prominently before the public; but they seem to show the mistakes which ignorance may and does make. How many are those which are never heard of, but whose influence is felt only in a dumb, unconscious way in the increase of expenses?

NEW YORK GRAIN RECEIPTS.

The receipts of grain at New York by the different routes this year present some peculiar features. We have before noticed that since canal navigation has been open a larger proportion than for several years before has been brought by canal. But there have been other noticeable changes. The Delaware, Lackawanna & Western has this year for the first time been able to compete for the supply of New York. As its rail connections beyond Buffalo are not yet as complete as those of the other trunk lines, we might have expected that it would not be able to secure a considerable amount or proportion until lake navigation opened; and as it is bound by no pool with the other trunk lines and has a traffic to build up, we might suspect that it would shade its rates from Buffalo enough to enable it to compete more successfully with the canal than they have done. But in fact we find that the Lackawanna brought more grain to New York in March than in any other month, and a larger proportion of the whole rail grain in May, when the canal receipts were small, than in June or July, when canal receipts were very large; while the total rail receipts fell off 20 per cent. from May to June, the receipts by the Lackawanna fell off 60 per cent., and since the canal has been open this railroad has, in fact, carried but very little grain—in the three months of May, June and July only 1,070,496 bushels (including flour), which is not as much as the New York Central has many times delivered in a single week. The Lackawanna could not be expected as yet to do as well as the older roads, but doubtless many may have imagined that it has diverted more grain from them than it actually has.

For the first three months of this year, grain receipts were large at New York. In the four following months they were small, compared with many previous years. The decline began with April, but as that belongs to the period when there are no canal receipts, we have given below a comparison of the receipts of the four months from January to April inclusive, and those of the three months from May to July inclusive. In the first four months of the year the New York receipts of grain and flour reduced to grain have been, for successive years:

1878.	1879.	1880.	1881.	1882.	1883.
33,192,923	36,487,494	30,890,402	32,831,153	20,970,429	30,014,713

While for the following three months, ending with July, they have been:

1878.	1879.	1880.	1881.	1882.	1883.
38,693,164	39,734,951	56,321,362	46,939,797	28,475,731	30,322,363

In the first four months, notwithstanding unusually

light receipts in April, the receipts were 11,000,000 bushels more than last year, and not much less than the average of the four years previous; but in the three months ending with July, the receipts were 27½ per cent. less than in 1878, 31½ less than in 1879, 87 less than in 1880, 39 per cent. less than in 1881 and only 6 per cent. more than in the very bad year 1882.

Now, as the small receipts this year have been during the time that canal navigation was open, it follows that if the canal receipts have been as large as usual, the whole decrease must have been on the railroads, and that their receipts must have been especially small. Actually the water receipts (not quite all by canal) in these three months have been:

1878.	1879.	1880.	1881.	1882.	1883.
23,544,033	14,741,322	31,396,750	18,118,589	11,504,316	10,531,803

It should be noted that the canal opened early in 1878, 1880 and 1882, and much later in the other years. The receipts by water this year are equal to the average of years of late opening.

Now this leaves the rail receipts of the three months ending with July as follows:

1878.	1879.	1880.	1881.	1882.	1883.
14,959,131	24,904,639	21,824,612	28,791,138	15,707,396	13,096,560

We thought we had hardly learned to carry grain in competition with the canal in 1878, but more was received at New York by rail than this year in these three months, and the rail receipts this year were 11,300,000 bushels (45 per cent.) less than in 1879, 11,100,000 (44 per cent.) less than in 1880, 15,095,000 (52 per cent.) less than in 1881 and even 2,000,000 (12½ per cent.) less than in 1882, when receipts were small because there was very little to receive.

It will be seen, therefore, that the distribution of the rail grain among the several railroads in these three months has been a matter of comparatively little importance this year. The gross earnings of the trunk lines (east of Buffalo, Pittsburgh and Erie) from it have probably been less than \$850,000, while in 1880 this traffic yielded them more than \$1,800,000 in the corresponding three months. Now it is precisely in these three months that the rail receipts have been so small that there has been the greatest change in the proportions brought by the several routes. The New York Central, which usually leads and led largely during the three months that the rail receipts were large this year, in April, when they became small, carried only about the same as the Erie. In May rail receipts increased a trifle and then the Central was far ahead again. In the two months following, when rail receipts have been much smaller, it has carried considerably less than the Erie. This will appear very clearly by the following statement of the receipts at New York by each railroad in each month of this year (flour and grain) in bushels:

	N. Y. Cen.	Erie.	Pennsylvania.	Lackawanna.	Total rail.
January.....	4,548,973	2,784,824	1,476,522	146,915	8,956,410
February.....	3,325,332	1,849,909	1,046,744	257,910	6,480,895
March.....	4,328,383	3,206,645	1,200,868	766,069	9,501,965
Three mos.	12,402,708	7,841,378	3,673,734	1,170,894	25,048,714
P. c. of total.....	43.7	26.2	14.4	5.0	100.0
April.....	2,049,606	2,642,397	692,551	495,917	5,280,471
May.....	2,280,036	1,505,225	948,230	594,091	5,327,582
June.....	1,508,016	1,673,399	911,706	231,177	4,324,298
July.....	1,144,955	1,364,446	923,492	241,948	3,670,841
Four mos.	6,977,023	6,885,449	3,416,959	1,568,413	18,847,854
Per cent.	36.8	36.1	18.0	8.1	100.0
Seven mos.	19,381,331	14,707,101	7,090,393	2,837,307	41,416,482
Per cent.	43.6	33.1	16.0	6.4	100.0

The difference between the sum of the receipts by the four roads named and the total rail receipts (400,350 bushels, or 0.9 per cent. of the whole, for the seven months) was received by other roads, which carry too little to be considered here.

In the first three months of the year we see that the New York Central brought to New York 4,531,000 bushels more grain and flour than the Erie; in the four months following, nearly the same amount. In July the Erie carried 39.7 per cent. of the whole and the Central but 29.4, but then the excess of 10.3 per cent. carried by the Erie amounted to but 399,491 bushels; while in March, when the Central carried 46.1 and the Erie 33.0 per cent. of the whole, the 13.1 per cent. of difference amounted to 1,291,535 bushels.

There is more in this than may be thought. The bare statement that the Erie brought nearly an eighth more grain to New York than the Central in June, and a third more in July, naturally leads one to suppose that the one has made great gains and the other suffered great losses, the fact being that both had great losses, compared with ordinary years, and that the Central simply lost a little more than the Erie. If the receipts had been as large as in the winter or in many previous spring months, the change in proportions would have been a much more important matter.

The Pennsylvania also has carried a much larger proportion since the canal opened than before; but this is largely due to the fact that it brings flour chiefly, which is not directed to the canal under any circumstances. In July, 50 per cent. of its deliveries at New York were flour. In the first four months of this year, it brought to New York 14 per cent. of its

total rail receipts of grain and flour; in the three months following, more than 20 per cent. But this large percentage does not make a large amount, applied to the much smaller receipts.

The receipts at New York by the principal railroads and by water, and the total receipts for nine successive years have been, for the seven months ending with July:

Year.	N. Y. Cen.	Erie.	Penna.	Water.	Total.
1875..	12,437,523	10,978,445	5,343,398	10,697,812	39,809,469
1876..	18,432,563	12,029,292	4,383,411	16,165,868	51,430,377
1877..	11,061,141	6,262,033	3,708,338	13,251,223	34,449,924
1878..	26,917,037	11,537,368	6,632,888	25,675,905	71,294,033
1879..	30,834,432	17,111,927	11,184,752	15,761,665	75,535,879
1880..	28,144,835	17,360,230	8,765,964	32,379,928	87,112,314
1881..	24,660,617	22,677,946	12,191,904	31,079,981	79,790,860
1882..	18,119,847	11,304,618	6,847,992	12,768,175	49,446,200
1883..	19,381,331	14,707,101	7,090,393	17,826,584	62,243,066

The Lackawanna, first opened this year, brought 2,800,000 bushels to New York in the seven months, which is 6.3 per cent. of the rail receipts and 4.6 per cent. of the total receipts.

With the exception of last year, when the receipts were from a crop of cereals more than 600 millions of bushels (in the whole country) less than in any other since 1878, the receipts this year were less than in any other since 1877, and yet New York has had nearly its usual proportion of the total Atlantic grain receipts this year, 44.3 per cent. of the whole against 54.9 in 1882, 46.6 in 1881, 45.2 in 1880, 52.6 in 1879 and 46.2 in 1878.

The rail receipts, though exceptionally small in the last four months, were so large in the first three months of this year that, though much less in amount than in any previous year since 1877 except last year, they were a larger proportion of the whole than in 1876, 1877, 1878 and 1880. The canal receipts were less than in 1878, 1880 and 1881, 1881 as well as this year having been a year of late opening.

Under ordinary circumstances, with the railroads adhering to paying rates, in a season of light shipments the railroads are likely to have a smaller proportion of the whole than in a season of heavy shipments. Grain and lumber may be said to be almost the sole dependence of the canal boats for east-bound freight. If they do not get this, most of them get nothing. By carrying low enough the railroads can get most of this freight from the boats, and for a time drive them out of business, but these low rates are actually more unprofitable to the railroads than to the boatmen. With traffic much larger than it has been this season, there would be little increase in the tonnage of boats offering, and the excess would go by rail. The recent great advance in canal rates indicates that such a time has come now, for the first time this season. Further, a large proportion of the rail receipts at New York are usually of corn shipped from interior points in the West so far south of the lakes that not much of it goes to them or to the canal at all. This year and last light corn crops have materially reduced this traffic.

The receipts by the different routes this year have a special interest because of the abolition of canal tolls and the opening of the Lackawanna road to Buffalo. So far as the abolition of the tolls is concerned, it seems unquestionably to have helped the boatmen greatly, but it does not appear from the above that it has helped New York, which has received a somewhat smaller proportion of the total Atlantic grain receipts this year than in any other since 1876. The opening of the Lackawanna road, on the other hand, seems to have had little effect. Grain, which can be reached by lake vessels to a great extent independent of rail connections, is the east-bound freight which a new trunk line can most easily obtain; but the Lackawanna this year has brought but one-sixteenth of the rail grain to New York. In this as in other traffic it takes time to build up a traffic, however, and it will not do to judge of the ability of the Lackawanna to command grain shipments by what it has done in these seven months of its infancy. As nearly as we can learn, it has been much more successful in securing west-bound shipments from New York.

Pennsylvania Railroad Earnings and Expenses in July.

The report of the Pennsylvania Railroad Company's lines east of Pittsburgh and Erie for July this year and last is as follows:

	1883.	1882.	Inc. or Dec.	P. c.
Gross earnings.....	\$4,130,950	\$4,149,150	-\$18,200	0.4
Expenses.....	2,638,216	2,502,057	+\$136,159	5.4
Net earnings.....	\$1,492,734	\$1,647,093	-\$154,359	9.5

The slight decrease in gross earnings is not particularly significant, for these gross earnings were larger in July than in any previous month of last year; but more significance attaches to the fact that this year the July earnings are smaller than in June, May or March. The lateness of the grain movement may partly or wholly account for the decrease from last year. The receipts of grain at Philadel-

phia and Baltimore were 5,353,000 bushels last year, against 3,902,000 this year.

The increase in working expenses this year is much less than it has averaged heretofore this year, and the whole amount of these expenses in July was \$340,000 less than in June, and less also than in May or March.

The decrease of 9½ per cent. in net earnings is considerable, but the amount of net earnings in July was about equal to the average of this year, and \$313,000 more than in June, when, however, they were exceptionally small, the expenses then being 72 per cent. of the earnings, against 58½ for the seven months.

Meanwhile the lines west of Pittsburgh and Erie during July netted a surplus over all liabilities of \$126,759 this year, against \$319,567 last year, a decrease of \$192,808, which with the decrease in net earnings on the Eastern system makes a decrease of \$347,167 in the profits of the two systems in that month, which is equal to about ¾ per cent. on the capital stock.

For 11 successive years the earnings and expenses of the lines east of Pittsburgh and Erie have been:

Year.	Gross earnings.	Expenses.	Net earnings.
1873.....	\$3,203,462	\$2,251,913	\$951,549
1874.....	3,181,785	1,961,160	1,220,625
1875.....	3,073,103	2,013,126	1,059,977
1876.....	2,921,284	1,857,589	1,063,695
1877.....	1,880,337	1,400,978	479,359
1878.....	2,536,733	1,485,670	1,051,063
1879.....	2,782,906	1,783,291	999,615
1880.....	3,449,644	2,147,139	1,302,505
1881.....	3,780,418	2,280,447	1,499,971
1882.....	4,140,150	2,502,057	1,638,093
1883.....	4,130,950	2,638,216	1,492,734

Thus the gross earnings this year, though a little less than last year, were much more than in any previous July—\$350,000 more than in 1881, \$681,000 more than in 1880, \$1,348,000 more than in 1879, and \$1,594,000 (63 per cent.) more than in 1878. The extremely small earnings in 1877 were due to the great strike and the Pittsburgh riots. The working expenses were larger this year than in any other July, and were \$1,153,000 (77 per cent.) more than in 1878, and \$491,000 (21½ per cent.) more than in 1880, when traffic was very large, but expenses had not risen as they did later.

Notwithstanding the great increase in expenses, the net earnings this year are larger than in any other July, except last year, though nearly the same as in 1881. It must be remembered, however, that the company's stock capital has largely and its funded debt slightly increased since 1881. It requires about \$7,200,000 to pay 8 per cent. on the present capital stock, which is \$2,110,000 more than the amount of dividends paid in 1882, and \$3,140,000 more than those paid in 1881. To pay the same dividends and have the same surplus the net earnings should average \$175,000 a month more than last year, and \$262,000 more than in 1881. But the surplus was more than \$175,000 a month in 1881, and was \$185,000 last year.

It is hardly to be expected that there will be an increase in earnings over 1882 in the last five months of the year, for the reason that earnings were very large at that time last year. Nearly 45 per cent. of the gross and no less than 46½ per cent. of the net earnings were made in the last five months of last year. It is, however, probable that August will show a large increase over July, and it is not impossible that a decrease in working expenses may increase net earnings. The circumstances are not favorable to an increase in earnings of the western system, which must suffer from the great falling-off in the crop of winter wheat and the reduced production of iron. The surplus over liabilities or the deficit of this system in July for five years has been:

1879.	1880.	1881.	1882.	1883.
Deficit.....	Surplus.	Surplus.	Surplus.	Surplus.
\$3,421	\$300,827	\$231,007	\$319,567	\$126,759

The decrease in surplus this year is probably about one-eighth of the net earnings of this western system, which last year were at the rate of just about \$1,000,000 per month.

For the seven months ending with July the earnings and expenses of the lines east of Pittsburgh and Erie compare as follows for the last two years:

	1883.	1882.	Increase.	P. c.
Gross earnings.....	\$28,483,532	\$26,790,999	\$1,692,533	5.4
Expenses.....	18,471,971	16,962,783	1,509,188	8.9
Net earnings.....	\$10,011,561	\$9,828,216	\$174,345	1.8

Up to the end of April gross and net earnings were both larger this year than last, and at that time there had been an increase of \$842,010 (17 per cent.) in net earnings, which is equal to 3½ per cent. on the stock. There has been no decrease in gross earnings except in July, but there was one in net earnings in each of the last three months, by which nearly four-fifths of the increase of the previous four months has been destroyed, and the increase is now less than 0.2 per cent. on the stock. As the net earnings last year were among the largest in the history of the road (\$2,032,862), a further decrease in net earnings this August is to be expected, and will be compatible with a large increase over July.

The gross and net earnings and working expenses for the seven months ending with July for seven successive years have been:

Year.	Gross earnings.	Expenses.	Net earnings.
1877.....	\$16,216,733	\$11,007,953	\$5,208,780
1878.....	16,988,671	10,591,710	6,396,961
1879.....	18,196,964	11,451,494	6,745,470
1880.....	22,883,715	13,483,801	9,399,914
1881.....	25,334,257	14,546,132	10,788,125
1882.....	26,790,999	16,962,783	9,828,216
1883.....	28,483,532	18,471,971	10,011,561

Gross earnings and expenses are both larger this year than ever before. Since 1879 there has been an increase of \$10,686,500 in gross earnings and of \$7,120,000 in working expenses. Since 1880 the increase has been \$6,000,000 in gross but only \$814,500 in net earnings, for while the gain

was 26 per cent. in earnings it was 37 per cent. in expenses, so that nearly nine-tenths of the immense increase in earnings has been absorbed by the additional expenses.

The net earnings, though \$174,345 more than last year, were \$476,564 less than in 1881; they were, however, larger than in any other year.

For these seven months the surplus or deficit of the lines west of Pittsburgh and Erie for five successive years has been:

1879.	1880.	1881.	1882.	1883.
Deficit.	Surplus.	Surplus.	Surplus.	Surplus.
\$422,758	\$1,611,963	\$1,755,871	\$355,030	\$309,690

Adding this to the net earnings of the eastern system we have as the profits from the two:

1879.	1880.	1881.	1882.	1883.
\$6,422,712	\$11,008,877	\$12,243,996	\$10,192,246	\$10,321,251

These profits were this year \$129,005 more than last year, which is enough to pay 1½ per cent. on the addition to the capital stock made last spring, but is only one-seventh of 1 per cent. on the total stock. The profits are \$1,922,745 less than in 1881, when the capital stock was \$12,000,000 less (equal to about 2½ per cent. on the stock in 1881), and were \$687,626 less than in 1880, when the stock was \$21,000,000 less than now. The decrease of \$1,300,000 and \$1,445,000 in the profits of the western system since 1880 and 1881 makes a very great difference in the Pennsylvania Railroad Company's profits. Aside from temporary causes, such as the light winter wheat crops (which will be felt hereafter more than heretofore), and the depression in the iron industry, this system has to meet the competition of the new lines in its territory, and as it was formerly the chief connection of the Erie, which has now a line of its own, it may be expected to feel this competition as much as any company, perhaps, the more so as the new Nickel Plate road is close alongside the Fort Wayne from Fort Wayne to Chicago, and must take away a part of the light local traffic of that country, while the Chicago & Atlantic must also compete for some small part of the local traffic of the Pennsylvania lines, as the Indiana, Bloomington & Western's Indianapolis & Columbus line does also. We may not then look soon for such profits from the Pennsylvania's western system as it had in 1880 and in 1881, or even last year; for though small for the first half of 1882, they were very large in the last half—yielding net for the year \$1,901,000, all but \$35,463 of which was made in the last half of the year. There is therefore reason to expect that the profits of the whole Pennsylvania Railroad system will be less this year than last, unless kept up by a decrease in the working expenses, which have become very large, indicating that the property has been maintained in the highest condition. They were 63.95 per cent. of the earnings this year, against 63.29 last year, 58.60 in 1881, and 58.37 in 1880.

There has been no increase in wages and some decrease in prices this year, though the latter has probably not yet affected expenses appreciably, and the increase in the percentage of expenses is probably due chiefly to lower average rates this year. Through rates, however, have certainly been higher this year, on the average.

In the iron and coal traffic a very considerable reduction in rates was to be expected this year; but if there has been a general decrease in rates, with the increase of 5.4 per cent in gross earnings, there must have been a very large increase in traffic.

Murphy's Locomotive.

The engraving, fig. 1, represents a plan of locomotive which has recently been patented in this country, and is a curious illustration of the kind of mistakes which may be made by inventors who have only a superficial knowledge of the mechanism to the improvement of which they devote their ingenuity.

The proposed construction of the engine is at once apparent from the engraving, and will require no further explanation than to say that the cylinder *C* is placed between the two driving-wheels, and the piston-rod extends both ways through the front and back cylinder-heads, with a cross-head at each end. Each cross-head is connected with one of the driving-wheels by the rods *F F*.

The advantages which the inventor claims for this method of constructing locomotives are that nearly the whole weight of the engine is supported by the driving-wheels; the parallel-rods are dispensed with, and the fire-box can be made as long as is desirable—all of which such an engine would have if it were otherwise practicable.

The following extracts from a letter from one of the parties interested in the patent, will indicate the high hopes which are entertained of the success of the discovery. The writer says:

"We are anxious to get the locomotive introduced and tested, as it is the opinion of several master mechanics that it is a very great improvement.

"The inventor claims that an engine or locomotive built after his patent will make greater speeds and draw a heavier train than any locomotive built on the usual plan of building. The specifications all point out some of the advantages gained, but there are others not mentioned and of real merit. * * *

"We think this locomotive will come very near Mr. Vanderbilt's proposition, which was published in some papers late last year, for a locomotive that will draw 15 sleepers 60 miles per hour, though we do not enter for that premium."

It is not often that we hear of an invention, of which such high hopes are entertained, of which it can be said that it is absolutely impossible for it to work. No matter how impracticable and uneconomical the mechanism may be, yet it is usually so devised that under some conditions it will do in some fashion what it was intended for. In the present

case, however, it would be impossible for a locomotive, if constructed like the one illustrated, to turn its wheels!

As nearly all young designers "scheme" out the same idea at some time or other, it may be worth while to explain why such a locomotive could not turn its wheels.

Figs. 2 and 3 are diagrams showing the driving-wheels, cylinders, crank-pins and connecting-rods. In fig. 2 the crank-pins *c* and *c'* are represented at the dead-points. The cross-head pins are represented by *d* and *d'*. It will be noticed now that the two crank-pins are connected together

not make an entire quarter revolution, so that one of them must slip. While *c* moves through the second quarter of its revolution *c'* must move through more than a quarter, so that one of them must slip again.

Doubtless the inventor has expended much time and some money in developing his discovery, which, excepting for the mental discipline gained, must be a complete waste of both. He is also visiting the various master mechanics within his reach and is wasting their time by importunities to try his new plan. It is a pitiable example, of which there are hun-

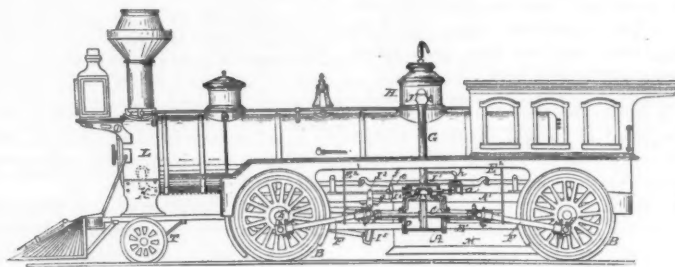


Fig. 1.

D. R. MURPHY'S LOCOMOTIVE.

by the connecting-rod *c d*, piston-rod *d d'* and connecting rod *d' c'*, whose combined length is equal to the distance of *c* from *c'*, or that between the centres *o o'* of the axles of the driving-wheels. Supposing now that the crank-pin *c* has moved from the dead point a distance equal to 45 degrees of a complete revolution, as shown in fig. 3. If the crank-pin is coupled by the connecting-rod to the cross-head pin *d*, then the distance from *c* to *d* must be the same in fig. 3 that it is in fig. 2, and the distance *d d'* must also be the same, and the length of the connecting-rod *d' c'* is also the same. It is obvious, though, that the distance in a straight line from the centre of the crank-pin *c* to the centre of *c'*, if they are in the

positions, of how ignorant persons by devoting their inventive faculties to matters of which they have no knowledge may squander their own and other people's thoughts, their time, their labor and their money in a manner which is absolutely useless. Doubtless this article will make at least one, probably two, possibly more enemies for the *Railroad Gazette*. We have already a considerable list of such, made in the same way. It will not be surprising if some local paper will charge the writer of this article in being the owner of some other patent, and that he is blinded and corrupted by his own interests. Whether he is or not, a locomotive like the one described will not be able to turn its iron wheels, all the same.

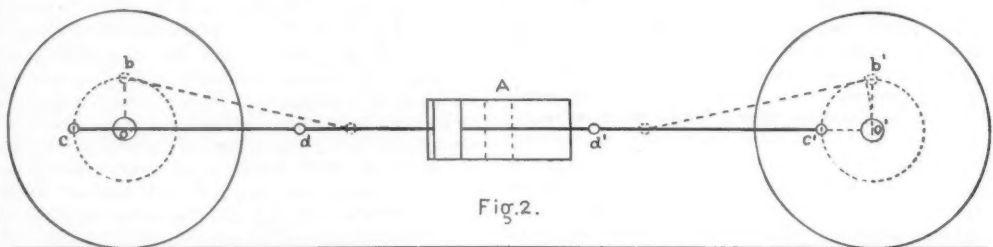


Fig. 2.

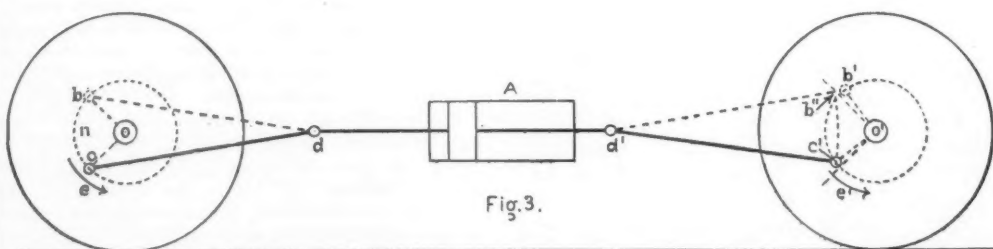


Fig. 3.

position and coupled to the rods, as shown in fig. 3, must be less than the combined length of the rods *c d*, *d d'* and *d' c'*, for the reason that the shortest distance between the two centres is a straight line, and *c d d' c'* in fig. 3 is not a straight line. Therefore, if the crank-pins are coupled up as represented, when *c* is 45 degrees or one-eighth of a revolution from the dead-point, *c'* must be a somewhat less distance from its dead-point. The small dotted circles *b b'* represent the crank-pins in the wheels on the opposite end of the axles, and are placed at right angles to the crank-pins *c* and *c'*. This being the case, if *c* is 45 degrees from the dead-point, *b* will be the same distance from it; but as *c'* is less than 45 degrees from its dead-point, *b'* must be more than 45 degrees from it. It therefore follows that the distance in a straight line from the centre of *b* to the centre of *b'* will be more than the distance from the centre of *c* to the centre of *c'* in fig. 2. But as the distance in a straight line from the centre of the bearings *b b'* of the connecting-rods when in the position indicated by dotted lines in fig. 3 is less than that from *c* to *c'* in fig. 2, it would be obviously impossible to couple the opposite crank-pins when *c* and *c'* are in the position shown in fig. 3, or if they were coupled up in any other position to turn the wheels without stretching the rods. As elastic rods are not mentioned in the patent, we have the curious fact that a patent has been issued for a plan of locomotive which, if constructed as proposed, could not turn its wheels. The owners of the patent are, under the circumstances, wise in not entering for Mr. Vanderbilt's premium, which, by the way, he never offered.

It will be noticed, too, that if one side only of the proposed engine was coupled up, one pair of the wheels would be compelled to stop part of the way during each quarter-revolution, because while the crank-pin *c*, fig. 2, is moving through a quarter-turn from the dead-point *n*, *c'* would

Grain and Flour Receipts and Exports at the Four Eastern Ports.

The records of Mr. E. H. Walker, statistician of the New York Produce Exchange, published in the last issue of the *Produce Exchange Weekly*, show that the receipts of grain and flour at these ports were smaller in July than in any other month of the year except April, and that the exports were smallest then.

The receipts in July and the percentage of the total at each port were, in bushels (including flour):

New York.	Boston.	Phila.	Baltimore.	Total.
9,680,312	1,486,444	880,328	1,963,500	14,010,584
Per cent. 69.1	10.6	6.3	14.0	100.0

New York and Boston together received 79.7 per cent. of the whole, which is an unusually large proportion. Their proportion of the whole in each of the seven months of this year has been:

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
New York.....	50.0	45.8	53.4	49.1	52.3	66.0	69.1
Boston.....	18.1	16.0	18.5	24.7	18.5	13.8	10.6
Both.....	68.1	61.8	71.9	73.8	70.8	79.8	79.7

New York's proportion increases almost always when canal navigation is open, and this year it has had the new Lackawanna road working for it, but not fairly beginning until March. June and July are the only months in which the canal receipts were considerable, but in June they were 57 per cent. of the total New York receipts and 38 per cent. of the receipts of the four ports. The effect on New York will be seen below in its percentage of the total receipts of the four ports in successive months, given above. Its percentage increased greatly after canal navigation opened, while Boston's decreased.

For the seven months ending with July receipts (grain and flour) at these ports have been, in bushels:

	New York.	Boston.	Phila.	Baltimore.	Total.
62,660,025	19,641,823	12,747,861	18,963,945	114,013,654	
Per cent.	55.0	17.2	11.2	16.6	100.0

New York and Boston together thus received 72.2 per cent. of the whole. New York had its largest receipts in June, but they were then very little larger than in March, before the canal was open. Boston's largest receipts were in January and March; in July they were not half the average of the previous six months. Philadelphia's average before July was nearly 2,000,000 per month; in July its receipts were but 880,000. Baltimore, which usually has a great increase in July over previous months, had then but 97,000 bushels more than in June, and from 1,033,000 to 1,774,000 less than in any other month of the year, except April. The large Baltimore receipts that usually have come in July came in August this year, and moreover were not quite so large as usual.

The exports of grain and flour from these ports in July were, in bushels:

	New York.	Boston.	Phila.	Baltimore.	Total.
Bushels	5,086,649	955,393	635,173	1,587,913	8,265,128
Per cent.	61.5	11.6	7.7	19.2	100.0

The total exports of the four ports in July were 59 per cent. of their receipts; but Baltimore exported 81 per cent., Philadelphia 72 per cent., Boston 64 per cent., and New York only 52½ per cent. of its receipts. When receipts are small, New York's exports are usually a smaller proportion of its receipts, because it consumes so much. Still in July its exports were nearly five-eighths of the whole, and Philadelphia and Baltimore together shipped less than 27 per cent. of the export grain.

For the seven months ending with July the exports of these four ports (flour and grain) were:

	New York.	Boston.	Phila.	Baltimore.	Total.
Bushels	43,813,292	9,213,333	7,900,097	16,748,081	77,674,803
Per cent.	56.4	11.9	10.2	21.5	100.0

The total exports for the seven months were 68 per cent. of the receipts, and the percentage of its receipts exported from each place was:

	New York.	Boston.	Philadelphia.	Baltimore.
	70.0	46.9	62.0	89.3

This shows the more usual course of the receipts and exports. Baltimore is the smallest consumer, and it exports by far the larger portion of its receipts. Boston consumes (and distributes for domestic consumption) more than any other place except New York, and its exports are not usually a large part of its receipts, though it is the chief flour exporter next to New York.

In July Boston exported 92½ per cent. of its flour receipts but only 41 per cent. of its grain receipts; and of the total flour receipts 23½ per cent. came to Boston and 60 per cent. to New York; and of the total flour exports 34 per cent. went from Boston and 56 per cent. from New York.

New York, it appears, exported considerably more than the other three ports together, while New York and Boston together exported twice as much as the other two places, which have lower rail rates.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

Louisville, New Orleans & Texas.—Extended northwest to Iberville, La., 31 miles.

New Orleans & Northeastern.—Track laid to a point one hundred and forty miles south by west from Meridian, Miss., an extension of 38 miles.

Northern Pacific.—The main line is completed by laying 79 miles of track between Helena, Mon., and Missoula.

Pittsburgh, Cleveland & Toledo.—Extended from Carbon, Pa., northwest to Struthers, O., 9 miles; also from Kent, O., eastward 24 miles.

Union Pacific.—This company's *Oregon Short Line* is extended westward to Kuna, Idaho, 60 miles.

Valley, of Virginia.—Extended from Greenville, Va., south by west 18 miles.

This is a total of 259 miles of new railroad, making 3,337 miles thus far this year. The total new track reported in our columns up to the corresponding date for 12 years past has been as follows:

	Miles.		Miles.
1883.....	3,337	1877.....	1,108
1882.....	6,544	1876.....	1,388
1881.....	3,719	1875.....	675
1880.....	2,950	1874.....	984
1879.....	1,569	1873.....	1,408
1878.....	1,123	1872.....	4,264

The new track reported has been exceeded only in three years out of the twelve—in 1892, 1881 and 1872. The year, however, still shows but very little more than half of the great mileage laid to date last year.

CHICAGO THROUGH RAIL SHIPMENTS EASTWARD for the week ending Aug. 21 for four successive years have been:

	1880.	1881.	1882.	1883.
Tons.....	30,241	58,226	27,687	38,500

Thus the shipments of the week this year were 10,813 tons (39 per cent.) more than last year, 19,726 tons less than in 1881, and 4,259 tons more than in 1880. This is the first week since the middle of May that the shipments have been more than in the corresponding week of 1880, through rates were higher than this year. The comparison with 1881 is of less significance, because rates then were not more than 15 cents per 100 pounds, and about this time fell to 12½ cents, against 25 this year and last; and last year there was so very little corn to ship that an increase over that year is possible with shipments still very light. It was not till the last week of August last year that there was an decided increase in Chicago shipments, such as we have this year in the third week. They are not due to

shipments of new wheat, as might be supposed, but more to corn shipments. The wheat that is forwarded now comes chiefly from places further south.

The percentage of the total shipments carried by each road has been as follows for the last two years:

	C. & G. T.	M. C.	L. S.	P. W.	C. St. L. & P.	R. & O.	C. & A.	N. Y. C. & St. L.
1883.....	11.8	13.7	15.8	20.5	13.0	6.3	13.8	4.3
1882.....	14.5	20.7	17.1	28.5	9.6	9.6		

The amount carried by the six roads which were in operation last year was 31,563 tons, which is 3,876 tons more than they carried last year and 4,678 less than they carried in 1880.

For seven successive weeks the shipments by these six roads have been, in tons:

	July 7.	July 14.	July 21.	July 28.	Aug. 4.	Aug. 11.	Aug. 18.	Aug. 25.
	23,584	27,456	27,603	24,453	29,058	26,459	31,563	

The shipments for the third week of August were the largest since the middle of May, and as the Chicago & Atlantic was not fairly at work till that time, we may compare the 36,899 tons shipped by all the roads but the Nickel Plate with the shipments earlier in this year, and find that they have been equaled but once since March. The shipments by the eight roads have been reported fully only since July. For these three weeks they have been 33,487 tons, 32,432 and 38,500 respectively. Last year the shipments did not reach the latter figure until November, though they very nearly reached it in the last week of August and the first week of September. In 1881 there was an increase of about 5,000 tons in the last week of August to more than 63,000 tons, which was about the average of the next four weeks, but in 1880 the shipments of the last week of August were less than those of the first week, and the average weekly shipments were 34,139 tons in July, 39,634 in August and only 35,189 in September. It is, perhaps, hardly to be expected that there will be a heavy movement this September. The spring wheat is not likely to come forward rapidly until the end of the month, and not only is the winter wheat crop light, but Chicago, so far, has been getting very little of it. More than four-fifths of Chicago's grain receipts last week were corn and oats. Its wheat receipts were but 11½ per cent. of them, and a fourth less than last year, and but half as great as in 1881, when the crop was less than this year. There is a great deal of grain in store in Chicago, however, and this may cause large shipments for a few weeks without much regard to receipts. Shipments actually are large, moreover, and have forced lake and canal freights to the highest rates known this year. The increase in corn shipments of late indicates that farmers feel certain of such a crop this year as will leave them a considerable surplus, though the shipments are not as large as in several years previous to 1882.

For the week ending Aug. 25, the incomplete report of through and local eastward shipments of flour, grain and provisions from Chicago by the eight roads shows a total of 35,465 tons, against 28,959 in the corresponding week of last year and 29,176 tons in the previous week of this year. Judging by the heavy grain receipts early this week and the high lake rates, a further increase may be expected the current week.

FREIGHT RATES ON THE MEXICAN RAILWAY (Vera Cruz to Mexico) are cited by a correspondent of a London stock exchange paper, whose object doubtless was to bear the stock of the Mexican Railway Company. He makes a comparison of the rates from Vera Cruz to the city of Mexico, 263 miles, with those recently made for fruit from Los Angeles to New York by the Southern Pacific and connections, 3,200 miles. The rates per ton from Vera Cruz to Mexico he gives as follows. (We add the rate per 100 lbs.):

	Per ton.	Per 100 lbs.
First class.....	\$76.05	\$3.40
Second class.....	65.18	2.91
Third class.....	54.32	2.42
By passenger train.....	97.77	4.36

The rates for the 3,200 miles from Los Angeles to New York are \$1.50 per 100 lbs. for green vegetables, \$1.75 for oranges and lemons and \$2.57 for green fruit by freight trains, and \$5.14 for the same carried by passenger trains. The correspondent concludes that when the people who own the Southern Pacific have a connection with Mexico completed, they will not charge any more for carrying from New York to Mexico, 2,950 miles, than they now do for the 3,200 miles from Los Angeles to New York, and that this will not be healthy for the Mexican Railway.

So far as this goes to show that the up rates on the Mexican Railway are enormously greater than those of American roads, it is quite appropriate. Doubtless if the American roads carry to Mexico at something like ordinary American rates, the profits of the Mexican Railway will dwindle away to an alarming extent, but the comparison made is a most disingenuous one nevertheless. The Southern Pacific rates selected are extraordinarily low—probably the lowest made by the road, except, perhaps, on some wheat and ore shipments; while the rates from Vera Cruz to Mexico are the highest on the Mexican Railway. It would be easy to find Southern Pacific rates that would be four times as high as those quoted for fruit and vegetables from Los Angeles—perhaps ten times as high. These, to be sure, would still be much lower than the Mexican Railway rates.

The same correspondent quotes from statement made by Mr. Foster, late our Minister to Mexico, and which has wide circulation, relating to the different charges which

have to be paid on a cask of hams, shipped from New York to the city of Mexico. He made these eleven in number, exclusive of custom duty, amounting to \$19.59 (on 325 lbs.), of which \$3.25 was steamer freight to Vera Cruz, and \$7.60 railroad freight from Vera Cruz to Mexico, while no less than \$4.93 is collected between the steamer and the railroad at Vera Cruz harbor. But it will be a mistake to assume that these charges will all remain after a competing route is open, or that a competing route will escape all similar charges at the border or elsewhere. But as the Mexican Railway must meet the competition not only of the American roads which approach Mexico from the Rio Grande, two of which already penetrate a goodly distance, but also that of a new line from a Mexican Gulf port (Tampico), which may expect to carry part of the imports from European countries, it will doubtless have to reconcile itself to a great diminution of its income from import freights.

CROP PROSPECTS are now confined chiefly to corn and cotton. We cannot know what will become of the corn until it is out of the way of frost, and as it is very late this will not be till near the end of September for a considerable amount of it. A cool period in August sometimes ends with frost, but if not there usually is none in the corn country of the Northwest till the last third of September. A great deal of corn will be out of the way of frost by the middle of September, but a great deal will not be, and between the middle and the end of September probably two or three hundred millions of bushels of corn will mature if it gets a chance. If this week is passed without frost in the Northwest the chance is perhaps about even that there will or will not be one between the middle and the end of September. If the frost holds off there will doubtless be a larger crop than ever before, though not so large an average yield as in 1879 or 1880.

The cotton has certainly suffered much from drought; rains have come recently, but too late to prevent great damage. There are not yet sufficient data to make it possible to estimate the amount of the damage.

The spring wheat harvest is not yet ended in North Minnesota, Dakota and Manitoba, but it soon will be. All reports are favorable, and there is no doubt that there has been a vast improvement since June, when much of the grain was very unpromising, and a considerable one since July; but the area sown is so limited that the difference between a bad and a very good condition amounts to but a few millions of bushels.

The Department of Agriculture of Manitoba reports the crops excellent, and estimates that 6,250,000 bushels of wheat will be produced, which is rather more than one-third of the probable production of Dakota.

Oregon has had a most peculiar crop year. In the older part of Oregon (chiefly in the Willamet Valley) winter wheat is grown chiefly. This was nearly all winter-killed last winter, and was replaced chiefly with spring wheat, some of the seed for which had to be imported from California. East of the Cascade Mountains the wheat was not killed—in the new wheat country of Eastern Oregon and Washington. Not a drop of rain fell in either district from the middle of May till the middle of August. This is not so remarkable east of the Cascades, which has its wet and dry seasons like California, but it is as strange in the Willamet Valley as it would be here. Notwithstanding this, it is said that the crop, which was being harvested by the middle of August, will be two-thirds of an average in the Willamet Valley, amounting to about 3,300,000 bushels, and will be a full one east of the Cascades, producing from 5,000,000 to 5,500,000 bushels. The latter is probably an exaggerated statement, as the acreage, though rapidly increasing, is not very great there yet, where the country has been settled but a few years. The crop is so abundant that there is anxiety as to getting transportation for it; still at present vessels take cargoes from Portland to Great Britain, 63s. 6d. to 65s. per ton, which is at the rate of 45 cents per bushel. The largest shipments yet made in any year from Oregon were 6,263,263 bushels of wheat, and 492,720 barrels of flour, from the crop of 1881, equal to 8,480,503 bushels.

THE GERMAN RAILROAD UNION held its annual meeting in August, and a report of its officers showed that in the middle of July there were 98 different railroad managements which belonged to the Union, working in the aggregate 59,679 kilometres (37,068 miles) of road, 21,922 miles of which were in Germany, 12,271 in Austria-Hungary, 91 in Luxemburg, 420 in Belgium, 1,325 in Holland, 724 in Rumania, and 315 in Russian Poland. The increase in mileage during one year was 1,007 miles. No less than 10,951 miles of the roads in the Union were Prussian state railroads, substantially worked by a single authority, but represented by 11 different "directions," each of which is a member of the Union. The votes are nearly in proportion to mileage. Prussia is about to purchase about 1,900 miles more. The miles of state and private railroads in the Union in Germany, Austria-Hungary and other countries at the date of the report, were:

	State.	Private.	Total.	P. c. of state.
Germany.....	17,936	3,986	21,922	81.8
Austria-Hungary.....	3,459	8,812	12,271	28.5
Other countries.....	724	2,151	2,875	25.2
Total.....	22,119	14,949	37,068	59.7

The Union does not include all the roads, but it does nearly all those in Germany, Austria-Hungary and Rumania. All the roads in Rumania are government roads; none of those (in the Union) in Holland, Belgium, Luxemburg and Poland. We have classed as state roads those

worked by governments. In Prussia the government works several roads that it does not own; in Austria (we believe) and in Holland certainly private corporations work some roads which are owned by the state.

The largest system in the German Railroad Union under one management is the Bavarian state system of 2,647 miles, not nearly as much as the mileage of several of our companies. The Prussian system (excepting the 9½ miles of the Military Railroad, which has a "direction" of its own), are divided up into systems of from 688 to 1,659 miles, as follows:

Headquarters of direction.	
Berlin	1,659
Frankfurt (East Prussia)	1,659
Elberfeld	749
Erfurt	910
Frankfurt-on-Main	688
Hannover	1,200
Cologne (for roads west of the Rhine)	1,031
Cologne (for roads east of the Rhine)	1,110
Breslau (for upper Silesian Railroad)	905
Magdeburg	940
Average	1,094

We see that two of the directions have their headquarters at Cologne, and together they have but 2,141 miles of road to work. It is probable that these two systems would be put under one management if the government, that is the Ministry of Public Works, that is the Minister Maybach—an experienced railroad man—did not think this too much for one management to attend to.

DOMESTIC WHEAT CONSUMPTION is a subject of considerable importance in calculating the surplus of crops available for exportation. A difference of half a bushel in the average consumption per individual will make a difference this year of 27½ millions of bushels—more than the production of Illinois, Iowa or Missouri, and one-half more than the production of Dakota, which many are watching as if it were one of the chief sources of the world's supply, instead of some 4 per cent. of the production of the United States in a good year. The careful Statistician of the Produce Exchange in the last *Produce Exchange Weekly* takes the reported production of the United States for a series of years, subtracts from it the exports and the seed at 1½ bushels per acre, and dividing by the population, finds 4.65 bushels as the average consumption and surplus per individual. He then estimates that 0.65 bushel of this may be "surplus," and the average consumption but four bushels.

But if this is true, the "surplus" must be thrown away every year, whereas, in fact, the surplus of one year is consumed or exported the next, and if a long enough period is taken it may be neglected entirely, as the total production of a series of years, less what is sown or exported, is all consumed in the country. The *Produce Exchange Weekly*, however, takes estimates for two years previous to the census, which the census indicated to be erroneous to a considerable extent, and did not use those for the last year, which are now complete, and its figures for population we cannot accept, though they are not far wrong. We take the figures for the last four years, beginning with the census year (1879 for acreage and production of crops), and find the aggregate of the four years to have been:

Production.	Exports.	Seed.	Balance.
1,842,310,000	632,790,000	208,612,000	1,002,908,000
Now, the population has been (allowing for the varying numbers of immigrants):			
1879.	1880.	1881.	1882.
49,723,000	50,155,000	51,827,000	53,652,000
Aggregate			
204,357,000			

This is the population at the beginning of the crop years whose production and exports are given, and all the figures are more nearly exact than for any previous years. Now, if the surplus June 30, 1883, was the same as June 30, 1879, then the 1,002,908,000 bushels excess of production over exports and seed were used for the consumption (for food and manufactures) of 204,357,000 people for one year, which is at the rate of 4.91 bushels per individual.

This is erroneous in proportion to the difference between the stocks on hand at the beginning and the end of this period of four years. These stocks cannot be known exactly, but it is universally allowed that they were exceptionally large this year, and they seem to have been rather small in 1879. Probably 40,000,000 bushels would be a very large allowance for the differences in stocks, which would be equal to nearly 0.2 bushel per inhabitant for the four years, and would reduce the average consumption per individual to 4.71 bushels. An addition of ½ bushel per acre more for seed (making it 1½ bushels) would bring the consumption down still further, to about 4.63 bushels, and it is not easy to understand what has become of the wheat produced in the last four years if the consumption for all purposes has not been as great as that, though it is certainly a very large allowance for food in a country where the people have such large supplies of other food, animal and vegetable, and where Indian corn forms the staple breadstuff of something like 7,000,000 people.

LAKE RATES have risen again, and on Saturday last reached the highest point since the opening, 4½ cents a bushel being paid for corn from Chicago to Buffalo. Vessels asked ¼ to ½ more for wheat, but all the charters were for corn. Last year the highest rate reached for corn was 3½ cents in the last week of October. In 1881, after June, 4 cents was the highest rate, and from August to the closing it ranged from 3½ down to 2; in 1880, which was by far the most profitable season since 1875, the corn rate was as high as 5 cents at this time, and after September rose to 7 and 7½.

Canal rates have also risen notably, and for several days have been 3½ cents per bushel for oats, 5½ for corn and 6 for wheat from Buffalo to New York, against 4½, 7½ and

7½ by rail. Usually when the difference is no greater the railroads carry a very large part of the Buffalo shipments. They are not doing so now, however; last Tuesday only 175,000 bushels, against 424,000 by canal. The rate on corn at this time last year was 4½ to 5½ cents, and it did not go any lower before the closing. A cent of this went for toll. In 1881 it was 4½ cents, and did not go above 5½. In 1880 it was 5½ Sept. 1, rose to 7½ by November, and reached 8 in that month. The rate is more profitable now to the boatman than in any of these years at this time.

Ocean rates meanwhile have changed little, fluctuating during the past week from about 8d. to 3½ for grain from New York by steam to Liverpool. It is noticeable also that the rates to London and Glasgow, usually considerably higher than those to Liverpool, are now nearly the same.

THE GRAIN MOVEMENT, so far as Northwestern receipts and shipments are concerned, made a notable change last week, becoming positively large, though it has heretofore since harvest compared unfavorably with previous years, when the increase due to the new harvest has usually been manifest in the second, third, or at latest in the fourth week of July, and sometimes reaches its maximum before this time. For six successive weeks the average weekly Northwestern receipts in June and the actual receipts thereafter in July and August have been, in bushels:

Av. in	1878.	1879.	1880.	1881.	1882.	1883.
June...	3,184,562	5,243,900	5,828,990	7,407,757	3,098,270	4,824,463
Week to—						
July 7...	3,008,568	8,775,678	4,500,527	5,258,897	1,886,422	2,871,034
" 14...	3,118,902	4,250,273	5,794,152	5,105,048	3,833,226	3,021,060
" 21...	4,380,991	4,319,601	7,28,850	4,931,748	5,615,149	3,825,076
" 28...	4,725,172	4,531,503	9,983,826	6,722,873	6,917,729	4,185,257
Aug. 4...	5,352,299	6,702,732	7,832,387	6,027,709	5,774,709	5,017,693
" 11...	6,334,446	6,371,438	7,813,510	6,093,745	3,563,361	5,563,246
" 18...	8,147,051	6,265,077	7,747,247	7,502,463	4,980,471	7,044,128
" 25...	9,015,180	6,539,199	8,555,570	8,110,023	6,474,275	5,000,419
Sept. 1...	8,790,893	7,428,249	6,677,299	8,520,755	5,063,419	5,820,710
Av. in	6,507,216	7,027,767	7,557,065	6,397,721	5,820,710	5,820,710

Last year the receipts increased rapidly through July and became very large in the fourth week of that month, but then there was a falling off for three weeks, followed by very large receipts in the last two weeks of August, but not any very heavy movement afterwards in the fall. In 1881 the heavy movement began also in the fourth week of July, but it continued through August and half of September after which receipts were light. In 1880 the movement was heavy as early as the third week of July, and it remained so through August and September. In 1879 there was a heavy movement as early as the first week of August, and this continued without interruption through that month and September. The movement was a little later in 1878, but the heavy movement then began a week earlier than this year, and it continued heavy till October.

The question now is whether the receipts of the week ending Aug. 18 were exceptional or the beginning of a period of heavy receipts. The latter is not excluded by the fact of a light winter wheat crop. In the first place five-eighths of the grain receipts are not wheat, and there is a large crop of oats to market, and a considerable surplus of last year's wheat and corn crop; and in the next place the failure of all grain in 1881 did not prevent a heavy movement in August and September, though it very greatly reduced it for the next nine months. It is quite possible to have a heavy grain movement for several weeks now, especially if the corn crop matures so that the farmers shall be confident that they can depend upon it without resorting to their stock of old corn.

NEW PUBLICATIONS.

Applications of Electricity on Railroads.—The publishing house of A. Hartleben, Vienna, illustrates in a very striking way the manifold applications of electricity to industry that have been introduced, mostly of recent years, by issuing what it calls an "Electro-technical Library," which already includes no less than twenty different works, each on a different subject. The twelfth of these volumes, of 327 16mo pages, by L. Kohlfirst, treats of electrical appliances on railroads, and especially signaling apparatus ("Die Electricischen Einrichtungen der Eisenbahnen und das Signalwesen"). The author is known by previous works, chiefly on signaling, and has included in his investigations works completed only this year. Lateness is more important in electrical matters than in most others, because there is so much that is new which is constantly being introduced.

The subjects treated of in this volume, after an introduction on the development of electrical railroad appliances and some preliminary remarks concerning electricity and the means of generating and conducting it, are railroad telegraphs in general, "line telegraphs," by which are meant the apparatus almost universally used in Germany for signaling from numerous points between stations, usually from the sentry boxes, as they may be called, where the track watchmen have shelter, by which a few prescribed messages can be sent to the nearest station which has an operator, as "track not passable," "accident; send help," etc., and telegraphing to and from trains through a portable apparatus which can be applied to a certain wire at any point on the line, which is said to be carried on many passenger trains on French, German and Russian railroads.

The general subject of railroad signals is discussed under the heads of "through line signals," "distress signals," "distance signals," and "train-covering signals." By "through line signals" are meant signals from one telegraph station to another, which are received and understood at all the intermediate watchmen's houses, usually made by electric bells. Comparatively a large space is given to these signals, which have received very little application so far in this country. The "distress signals" (more accurately trans-

lated by "signals for help") are those made in case of accident to a train, the disabling of a locomotive or other accident which prevents a train from proceeding; but they also include intercommunication signals on trains to enable conductors and brakemen to communicate with the engineer, for which many appliances have been designed in Europe, and of which there is more need in this country than those who consider passenger train service only suppose. No less than 40 pages are given to the "distance signals," which American railroad men are only beginning to appreciate. More than twice as much space (88 pages) is given to "train-covering signals," and there is another long chapter on "safety apparatus for switches," including interlocking apparatus, etc. Following is a chapter on "apparatus for control"—that is, to exercise what we may call a mechanical inspection, such as that of the "watchman's time detector," or the train speed indicator.

Among these Mr. Kohlfirst includes the apparatus by which the position of the distance signal or of a switch at every change is indicated—telegraphed back, as it were—to the signal box or elsewhere, and others that show whether lanterns which are out of sight are actually burning, and those indicate to the person in the control of the pumping apparatus the height of the water in the reservoir which he is filling, as well as speed recorders, of which latter he describes several. "Brakes" form the subject of another chapter, which is chiefly devoted to the Achard electric brake, which made considerable noise in the world as early as 1865, and has been tried in a modified form quite recently, but it also mentions briefly the electrical brakes of Olmstead and Walter.

The final chapter on other electrical railroad appliances has but six pages, and therefore we may regard the book as substantially a treatise on electrical signaling apparatus. It is quite fully illustrated (with 130 engravings), but in spite of what may be thought the narrowness of the field which it covers, it will probably be found to be too brief and general, rather than too full and detailed. In fact the author describes it as intended to be a popular treatise, not aimed exclusively for the use of railroad men.

The Electrical Railroad.—This is the seventeenth volume of Hartleben's "Electro-technical Library," described above—267 pages on a subject which is but just born, as it were. Considering how little has been done with railroads of this kind, it would seem hardly possible to make a book about them; and indeed the author of this volume (Mr. J. Krämer) seems to have met this difficulty, for the first 156 of his 267 pages are given to railroad construction, electricity, electrical machines and electrical transmission of power in general; a chapter of 20 pages goes to steam engines and boilers and other motors for dynamo engines, and a large part of another to the construction of cars, so that a chapter of 33 pages on the general arrangement of an electrical railroad, and one of 21 pages on conducting electricity for the purpose of working an electrical railroad, and some 10 pages on the electrical portion of the car construction, form what relates peculiarly to electrical railroads. There is no description of any such railroads that have been actually constructed. The work is illustrated with 105 engravings and two plates.

THE SCRAP HEAP.

Locomotive Building.

Mr. J. Augustus Durgin having resigned his position as Agent and Superintendent of the Rhode Island Locomotive Works in Providence, the duties heretofore performed by him will be divided. Mr. Wm. H. Tanner will be Agent of the works; Mr. Wm. P. Chapin will attend to the purchase of materials and supplies, and Mr. Joseph Lythgoe, heretofore General Foreman, will be Superintendent of the shops. H. K. Porter & Co. in Pittsburgh are running their shops full, with a number of orders for light locomotives on hand. A company has been organized in Nashville, Tenn., to build locomotives for logging roads, tramways and similar work.

The Mt. Savage Locomotive Works at Mt. Savage, Ind., have taken the contract to build the locomotives for the new Anniston & Atlantic road in Alabama.

Car Notes.

The Pullman Car Works, at Pullman, Ill., have taken an order to build several passenger and baggage cars for the Anniston & Atlantic road.

The Barney & Smith Manufacturing Co. in Dayton, O., has just completed a special car for President Villard, of the Northern Pacific, which is said to be the most elaborate and costly car ever built.

The Georgia Car Works at Cartersville, Ga., are to build a number of freight cars for the Anniston & Atlantic road.

It is stated that the Mann Boudoir Car Co. has closed an agreement with the New York, New Haven & Hartford and the Boston & Albany Railroad companies for running Mann boudoir sleeping cars on the New York & Boston route, by way of Springfield, after Oct. 1. The cars will be of the same design as the train which the Mann Boudoir Car Co. is now building at the Gilbert Works, Troy, N. Y. Cars of this pattern are in use to some extent in Europe.

Bridge Notes.

The Pacific Bridge Co., of San Francisco, has taken a contract to build a bridge over the Umatilla River near Pendleton, Oregon.

The Pittsburgh Bridge Works are busy on a number of orders for iron bridges.

The Niagara Bridge Works in Buffalo, N. Y., have just completed a bridge of four spans over the Coosa River in Alabama, for the Georgia Pacific road.

Raymond & Campbell, in Stillwater, Minn., have taken the contract to build a combination truss bridge over the St. Croix River on the Grantsburg Branch of the St. Paul & Duluth road.

Iron Notes.

The Allentown Rolling Mill Co., in Allentown, Pa., has converted its iron rail mill into a mill for the manufacture of structural irons of all shapes in ordinary use.

Keystone Furnace at Chain Dam, Pa., owned by the Thomas Iron Co., went into blast last week.

Spaulding, Jennings & Co. have remodeled the plant in their rolling mill at West Bergen, N. J. They have disconnected their three-high 9 in. train from the main engine, and are driving it independently by a Westinghouse engine of 150 horse power. The engine is 14 by 14 in., and runs 300 revolutions per minute. It stands between the train and the polishing rolls, and drives each by a separate belt. The belt driving the train has a speed of over 7,500 ft. per minute, which is possibly the highest recorded belt speed.

The assignees of L. B. Ward have transferred his rolling mill at Niles, O., to Cleveland, Brown & Co., of Cleveland, O., and the mill has been started up.

It is expected that the new organization will take possession of the works of Brown, Bonnell & Co. in Youngstown, O., early in October.

Clare Furnace in New Castle, Pa., which is 65 ft. high and 16 ft. bosh, made in one week recently 755 tons of pig iron. The furnace uses coke for fuel, with one-third each of native ore, lake ore and cinder.

The new steel works of Anderson & Dupuy in Chartiers, Pa., are doing a good business, although hardly yet in full blast.

Manufacturing Notes.

Chas. W. Pickering & Co., of Philadelphia, manufacturers of car and locomotive springs, have opened a branch office in the Boreel Building, No. 115 Broadway, New York, under the management of Mr. A. L. Rowe.

The Westinghouse Machine Co. in Pittsburgh recently shipped two Westinghouse engines of 100 horse-power each to the water works at Council Bluffs, Ia. Each engine is coupled directly to a 15-in. Andrews centrifugal pump. These engines will make 300 revolutions per minute, and are fitted with an adjustable cut-off, in order that the speed may be varied to meet the varying heights of lift.

The Rail Markets.

Steel Rails.—Quotations continue at \$38 to \$38.50 per ton at mill for near deliveries. Some large orders for winter delivery are on the market, and it is said that \$38.50 has been offered to several mills, but not taken.

Rail Fastenings.—Spikes are still quoted at \$2.60 per 100 lbs. in Pittsburgh, and track bolts at \$3 to \$3.25. Splice bars are unchanged at 1.90 to 2 cents per pound.

Old Rails.—Philadelphia quotations are \$22.50 to \$23 per ton for old iron rails, tees, and \$25 for double-heads, but with only small sales at those prices.

Carrying Milk to San Francisco.

A novel experiment has been tried in connection with the pilgrimage of the Baltimore and Washington Knights Templar to this city. When the special train left Washington, Frank K. Ward, proprietor of the Alderney dairies, placed 200 gallons of milk in the hotel car of the train with the understanding that the milk should be as sweet when it arrived in San Francisco as when he placed it aboard the car. If the milk was delivered in this condition, he was to receive \$1 per gallon. A Call reporter boarded the train carrying the milk, and was treated to a large glass of the lactical fluid by Mr. Ward, and was compelled to admit that it was as sweet as any he had ever tasted. The gentleman has therefore earned his money. The milk was served up on the tables of the Russ House, at which place the Atlantic Club, which brought the milk on its train, has its headquarters. Mr. Ward also ventured the information that he could ship milk any desired distance, and that it would be just as sweet on reaching its destination as on the day of shipment. The experiment has been watched with considerable interest by both dairymen and milk consumers, all of whom will be greatly rejoiced by the success of Mr. Ward's venture.—*San Francisco Morning Call.*

A Costly Bit of Road.

Two million dollars a mile would be considered in this country a rather large figure for the cost of building a railway, even by a Nickel Plate syndicate, yet that is the estimate on which the cost of an English railway, about to be begun, is based. It must be stated, however, that the course of the projected road is in probably the most costly section on earth—the metropolis of London, extending from Paddington, the terminus of the Great Western Railway, to the docks of the city, via the Regent's Canal, which a report of a recent meeting of the company says was acquired the past spring, thus securing the large quantity of surplus land on which the future interests of the company somewhat depend. As to the progress of the company itself, the chairman said, a material question had been that which had been somewhat exercising Parliament of late, the payment of interest out of capital during construction—a proceeding which they had thought the circumstances of the company justified. However, Parliament had decided otherwise. They must consider the state of the money market before asking the public for the capital required for the other portion of the undertaking, he added. He then described the course of the railway from Paddington to the city, and stated that they had decided so far to construct first the portion of the line between St. Pancras and the Barbican. Whether the proposed road is to be under or above ground, the report mentioned does not state.

Attempts at Train Wrecking.

On the night of Aug. 28 an attempt was made to wreck an express train on the Boston & Albany road by piling ties on the track near Ashland, Mass. The engine fortunately struck them with sufficient force to throw them off the track, and no damage was done.

A dispatch from Chattanooga, Tenn., Aug. 29, says: "A dastardly attempt was made to-day to wreck the south-bound day express on the East Tennessee, Virginia & Georgia Railroad near Knoxville, Tenn. This train is one of the fastest on the road, and while going at fully 45 miles an hour the engineer discovered a rail chained across the track. There were over 250 passengers on the train. The engineer, realizing the impending danger, by a superhuman effort threw the lever back and checked the speed, but the pilot struck the rail. The chains were wrenched asunder and the track cleared. A few miles further on another attempt was made, but this likewise proved futile."

General Railroad News

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:
Chicago & Eastern Illinois, annual meeting, at the office in Chicago, Oct. 2, at noon. Transfer books close Sept. 21.
Highland Junction, annual meeting, at the office, No. 51 Chambers street, New York, Oct. 9, at noon.
Minneapolis & St. Louis, annual meeting, in Minneapolis, Minn., Oct. 2. Transfer books close Sept. 1.

Dividends.

Dividends have been declared as follows:
Boston & Albany, 2 per cent., quarterly, payable Sept. 29 to stockholders of record on Aug. 31.

Chicago, Burlington & Quincy, 2 per cent., quarterly, payable Sept. 15 to stockholders of record Aug. 27.

St. Wayne & Jackson (leased to Lake Shore & Michigan Southern), 2½ per cent., semi-annual, on the preferred stock, payable Sept. 1.

Oregon Improvement Co., 4 per cent., semi-annual, payable Sept. 15. Transfer books close Sept. 5. The last dividend was 3½ per cent.

Railroad and Technical Conventions.

The *Road-Masters' Association of America* will hold its first regular meeting in St. Paul, Minn., Sept. 12.

The *Master Car-Painters' Association* will hold its annual convention at the Carrollton Hotel, Baltimore, beginning on Wednesday, Sept. 19.

The *New England Road-Masters' Association* will hold its first annual meeting in Boston, Sept. 20.

The *American Street Railway Association* will hold its next meeting in Chicago, Oct. 9.

The *American Institute of Mining Engineers* will hold its autumn meeting in Troy, N. Y., during the second week in October.

The *General Time Convention* will hold its fall meeting at the Grand Pacific Hotel in Chicago, Oct. 11.

The *Southern Time Convention* will hold its fall meeting at No. 46 Bond street, New York, Oct. 17.

The *American Association of Railroad Superintendents* will hold its fall meeting in Washington, Oct. 23.

Mail Service Extensions.

Mail service has been ordered over new railroad lines as follows:

Northern Pacific, service extended from Helena, Montana, to Missoula, 131 miles. This completes the continuous mail service between St. Paul, Minn., and Portland, Oregon.

Foreclosure Sales.

The *Meadville Railroad* was to have been sold at Meadville, Pa., Aug. 20, but the sale was postponed until Sept. 10. The road extends from Meadville to Linesville, 22 miles, and the bonded debt amounts to \$125,000. The road is operated by the Pennsylvania Company, and it is expected that that company will buy it.

The *Lancaster Railroad* will be sold in Boston, Oct. 17, by George A. Parker, Wm. H. McNeil and Caleb H. Warner, trustees, under a decree of the Supreme Court. The road extends from South Lancaster, Mass., to Hudson, 8½ miles, and the first-mortgage bonds amount to \$47,000. The road was built in 1873, but has never been operated regularly.

ELECTIONS AND APPOINTMENTS.

Albert Southern.—At the annual meeting in Albert, N. B., last week, the following were chosen: President, F. O. Talbot; Directors, D. H. Calhoun, D. Cleaveland, N. H. Foster, D. D. Latwick, C. A. Peck, John Wallace.

Chicago, Milwaukee & St. Paul.—Mr. C. L. Rising is appointed Assistant General Freight Agent, with office in Chicago, in place of A. J. McCormick, resigned.

Cincinnati, Hamilton & Dayton.—Mr. C. J. Hepburn has been appointed Superintendent of this road and its leased lines in place of George S. Griscom, resigned. Mr. Hepburn was formerly General Superintendent of the Pittsburgh, Titusville & Buffalo, and more recently of the Evansville & Terre Haute road.

Mr. Jos. Ramsey, Jr., is appointed Engineer of these lines, and will have charge of the Maintenance of Way and Construction Departments, with office at Cincinnati.

Cresson, Clearfield & New York.—This new company has elected officers as follows: President, A. S. Morrow; Directors, James Condon, John Dean, F. Jaekel, F. A. Shoemaker, W. P. Smith, James P. Stewart; Secretary, Martin Bell; Treasurer, J. C. Gates.

Denver & Rio Grande.—It is said that the presidency of this company has been offered to Mr. Lovejoy, of Philadelphia, and to Mr. Stephen T. Arnot, of Elmira, N. Y. Up to date the board has not chosen a president.

East Tennessee, Virginia & Georgia.—Mr. J. W. Fry has been appointed Superintendent of the Atlanta Division in place of Mr. T. D. Kline, who goes to the Central Railroad, of Georgia. Mr. Fry has been for some time Superintendent of the Columbia & Greenville road.

Georgia Pacific.—Mr. L. D. Aylett is appointed Assistant Treasurer in place of H. C. Ansley, resigned.

Grand Trunk.—Mr. Frederick J. Thomas has been appointed General Paymaster for all the lines west of Detroit and Port Huron, including the Detroit Division, the Michigan Air Line, the Detroit, Grand Haven & Milwaukee and the Chicago & Grand Trunk. He has been for some years Paymaster of the Detroit, Grand Haven & Milwaukee.

Maine Central.—The following circular announces officially changes heretofore noted:

"J. S. Cushing, Treasurer of this company, having resigned that office, to take effect Sept. 1, 1883, the directors have elected J. A. Linscott, late Auditor of this company, as Treasurer, from and after that date.

"George W. York has been appointed Auditor, to take effect Sept. 1, in place of Mr. Linscott. Please take notice that from and after Sept. 1, all communications to the Treasurer or Auditor of this company should be addressed to J. A. Linscott, Treasurer, or G. W. York, Auditor, at Portland, Maine."

Northern Pacific.—The following circular is issued by Mr. John Muir, Superintendent of Traffic, under date of Aug. 27:

"The business of this department will be divided, and will be conducted, under the general supervision of the undersigned, by the following officers: Freight business east of Helena, J. M. Hannaford, Assistant Superintendent of Freight Traffic, St. Paul, Minn.; freight business west of Helena, A. L. Stokes, Assistant Superintendent of Traffic, Portland, Oregon; passenger business east of Helena, Charles S. Fee, Assistant Superintendent of Passenger Traffic, St. Paul, Minn.; passenger business west of Helena, E. P. Rogers, General Agent Passenger Department, Portland, Oregon; all ticket business, G. K. Barnes, General Ticket Agent."

PERSONAL.

—Mr. A. J. McCormick, Assistant General Freight Agent of the Chicago, Milwaukee & St. Paul road, has resigned his position after 23 years' service with the company, and will engage in other business.

—Mr. A. M. White, late of the Baldwin Locomotive Works, will take charge of the New York Locomotive Works in Rome, N. Y., as Superintendent, about Sept. 1. Mr. White will take a bride to Rome with him.

—Mr. Joseph A. Breen, one of the oldest railroad contractors in the country, died at his residence in Tryonville, Pa.,

Aug. 20, aged 62 years. He had held important contracts on many roads, and had also built a number of oil-pipe lines.

—The body found in New York Bay last week and supposed by some to be that of L. F. Booth, late Immigrant Agent for the trunk lines in New York, has been finally proved to be that of another person. Mr. Booth's whereabouts is still unknown.

—Mr. L. Bremond has resigned his position as Agent for the Chesapeake & Ohio at the terminal station at Newport News, Va. He has been connected with the road for 31 years, and has been at Newport News since the terminal works were first begun there.

—Mr. Robert B. Hayne, for 10 years past Paymaster of the South Carolina Railroad, shot himself in the right temple at his office in Charleston, S. C., Aug. 27, and must have died almost immediately. He had remained at his office all night and was found there dead early in the morning by a porter. He had been complaining for some time of headache and sleeplessness, and it is believed that his brain was affected. He was highly esteemed by the officers of the road and had many friends.

—John J. Hall, for some time past Assistant Engineer on the New York Division of the Pennsylvania Railroad, has disappeared from his office and residence in New Brunswick, N. J., and is believed to be a defaulter. The company's loss, however, cannot be very large, not over \$5,000, it is said. Hall had charge of the construction of the third and fourth tracks south of New Brunswick, and took advantage of his position to borrow money from contractors on the work. He also borrowed largely from others and is said to have made away with \$25,000 or \$30,000 altogether.

—Mr. J. Augustus Durgin having closed his connection with the Rhode Island Locomotive Works on Saturday, Aug. 25, was captured at an early hour next morning, on his return from a visit to Worcester, and taken to the Narragansett Hotel in Providence, where he was met by the foremen of the shops and presented by them with a very handsome gold-headed cane, bearing an appropriate inscription and costing \$100. The presentation speech was made by Mr. L. M. Butler, and, after Mr. Durgin had recovered from his surprise sufficiently to make an appropriate answer, the whole party sat down to an elegant supper.

Mr. Durgin, though still a young man, has had much experience in locomotive building. He learned his trade in the old Essex shops at Lawrence, Mass., under Mr. Arctas Blood, now Agent of the Manchester Locomotive Works. Later he was for several years in charge of the drawing room of the late Wm. Mason's shops in Taunton, Mass., and was afterwards for nine years Superintendent of the Pittsburgh Locomotive Works. From Pittsburgh he went to the Rhode Island Works as Agent and Superintendent, seven years ago, and under his management over 800 locomotives have been turned out from those works. Mr. Durgin sailed from New York in the "Alaska" on Aug. 28, intending to take a long vacation, and travel in Europe with his family for several months, before making any arrangements for the future.

—The *London Engineer* says: "Earl Granville having placed at the disposal of the Institution of Civil Engineers one of the six sets of invitations forwarded to the Foreign Office by the Northern Pacific Railroad Co., Mr. George Barclay Bruce, Vice-President, has been deputed to attend the formal opening of the line as the representative of the Institution. Having been Robert Stephenson's second pupil, and afterward a trusted assistant of that eminent engineer, this nomination seems to be a very appropriate one. In December, 1859, Mr. Bruce, in accordance with a wish expressed by Robert Stephenson shortly before his death, tested the great Victoria Bridge over the River St. Lawrence, at Montreal."

Mr. Bruce served an apprenticeship in the engine-shops at Newcastle-on-Tyne, before being permitted by his master to go out on railways under construction. Robert Stephenson's idea being that to become an engineer it was essential first to be a mechanic. After his apprenticeship he was employed on a number of different railroads in England, and in 1851 went to India to lay out the East Indian Railway, and later he was appointed Chief Engineer of the Madras Railway. He returned to England on account of illness in 1856. Afterward he was Chief Engineer of a number of lines in Germany, and has been employed since as Chief or Consulting Engineer on a number of other foreign and British lines.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings for various periods are reported as follows:

Seven months ending July 31:

	1883.	1882.	Inc. or Dec.	P. c.
Cin. Wash. & Balt.	\$993,072	\$893,937	I.	11.20
Del. M. & Ft. Dodge.	181,634	185,626	D.	2.20
Net earnings.....	24,651	58,762	D.	57.9
Eastern.....	1,972,394	1,832,752	I.	7.6
Norfolk & Western.....	1,428,623	1,216,494	I.	17.4
Net earnings.....	568,969	49,202	I.	22.5
Northern Central.....	3,419,138	3,072,245	I.	11.3
Net earnings.....	1,254,183	1,027,275	I.	22.1
Pennsylvania.....	28,485,536	26,800,063	I.	6.3
Net earnings.....	10,011,357	9,837,012	I.	1.8

Six months ending June 30:

Houston & Tex. Cen.	\$1,358,134	\$1,088,021	I.	24.8
Month of July:				
Cin. Wash. & Balt.	\$130,491	\$129,743	D.	12.7
Del. M. & Ft. Dodge.	23,227	23,568	I.	7.0
Net earnings.....	6,218	1,047		
Eastern.....	334,728	329,161	I.	1.7
New Orleans & N. E.	9,067			
Norfolk & Western.....	219,188	191,535	I.	14.5
Net earnings.....	96,972	84,741	I.	14.5
Northern Central.....	474,524	484,534	D.	2.1
Net earnings.....	176,039	204,397	D.	13.6
Pennsylvania.....	4,130,950	4,149,150	D.	0.4
Net earnings.....	1,492,734	1,647,093	D.	9.4
Vicks. Shreve. & Pac.	3,867	2,793	I.	38.3

Third Week in August:

Chi. & Gd. Trunk.....	\$52,228	\$36,035	I.	45.0
Chi. & Eastern Ill.	42,332	42,540	D.	0.5
Chi. Mil. & St. P.	404,060	316,493	I.	27.7
Chi. St. P. M. & O.	106,400	86,100	I.	23.6
Deer & R. G.	168,110	118,000	I.	41.7
Louis. & Nashville.....	277,570	235,795	I.	17.7
Mo. Pacific lines.....	1,154,236	1,121,902	I.	2.9
St. P. M. & M.	137,000	179,000	D.	23.5

* Deficit.

Petroleum.

The production of the Pennsylvania and New York oil fields for July is given as follows by *Stowell's Petroleum Reporter*, in barrels of 42 gallons:

	1883.	1882.	Inc. or Dec.	P. c.
Production.....	2,020,364	3,258,162	D.	38.0
Shipments.....	1,634,407	2,402,970	D.	32.0
Stock, July 31.....	36,371,922	30,715,144	I.	18.4
Producing wells.....	17,100	19,570	D.	12.6

The production is larger than for any previous month this year except June. It was exceeded in every month last year except December, and in every month of 1881 except January. Of the total production the Alleghany District in

New York furnished 16.3 per cent., the Bradford District Pennsylvania 58.3 per cent., the Warren District 13.4 per cent., and the Lower District 12.0 per cent.

The shipments were the smallest reported since February. They were exceeded in ten months of last year and in seven months of 1881.

The stock on hand reported is all in the pipe lines. It was increased by 385,987 barrels during the month.

During July there were 261 new wells reported and 20 dry holes. At the close of the month 262 new wells were reported in process of drilling.

Shipments for the month were as follows:

	Barrels.	Per ct. of total.
New York.....	729,711	44.6
Philadelphia.....	82,738	5.1
Baltimore.....	85	
Cleveland.....	470,491	28.8
Pittsburgh.....	38,300	2.4
Local points.....	193,373	11.8
Refined at Creek refineries.....	119,709	7.3
Total.....	1,634,407	100.0

Shipments of oil refined at Creek refineries (reduced to its equivalent in crude) were: New York, 74,783 barrels; Philadelphia, 858; Baltimore, 180; Boston, 15,941; local points, 27,947; total, 119,709 barrels.

Grain Movement.

For the week ending Aug. 18 receipts and shipments of grain of all kinds at the eight reporting Northwestern markets and shipments at the seven Atlantic ports have been, in bushels, for the past eight years:

Northwestern shipments.				
Year.	Receipts.	Total.	By rail.	P. c.
1876	4,280,052	3,872,963	1,520,811	39.3
1877	5,331,315	4,832,809	1,036,221	22.6
1878	9,015,180	5,725,812	1,303,453	22.8
1879	6,559,190	6,228,710	1,818,087	29.1
1880	7,747,247	7,789,435	2,032,203	29.9
1881	7,502,463	5,419,136	2,459,061	45.5
1882	4,919,471	4,596,555	1,891,578	41.1
1883	7,044,128	6,298,955	1,813,536	28.8

The receipts of the Northwestern markets for the week are remarkable, not only as 2,055,000 bushels more than in the corresponding week of last year, but especially because very much larger than before this season—1,479,000 bushels (26½ per cent.) more than in the previous week and 2,026,000 more than the week before that, though the latter were the largest since the middle of June.

The receipts of the week this year, indeed, are the largest since the last week of August last year, and with that exception are the largest for nearly two years. The increase over the previous week is not in wheat only but in other grains—475,000 bushels in corn and 434,000 in oats as well as 434,000 in wheat. The wheat receipts were larger than in 1880 even. The corn receipts, though twice as great as last year, were much less than in 1880 or 1881.

The shipments of these markets were also extraordinarily large—1,555,000 bushels (27 per cent.) more than in the previous week, larger than in any other week of the year except the first two after navigation opened, and with these exceptions and the last week of June in 1881 larger than any week since October, 1880. Thus in a season of light grain movement this week has shown suddenly a week with what would have been a heavy movement in any year.

The Atlantic receipts for the week, however, were smaller than in any corresponding week since 1876, and but 313,000 bushels more than in the previous week of this year. They were, however, the largest since May. The very large Northwestern shipments, having been chiefly by lake, will not be much felt at the Atlantic ports for three weeks. While the total increase over the previous week in Northwestern receipts was 1,479,000 bushels, Chicago gained 802,000, Peoria 312,000, Toledo 229,000, and St. Louis 128,000. Peoria and Chicago seem to be feeling the effect of the new harvest (of oats largely), which heretofore has been confined more to St. Louis and Toledo. But Toledo's receipts are the largest for three years, and 85 per cent. of them are wheat, while St. Louis and Toledo together received 71 per cent. of all the Northwestern wheat receipts.

The change in Atlantic receipts, compared with the previous week, consisted chiefly in an increase of 453,000 bushels at New York and of 185,000 at New Orleans, with a decrease of 283,000 at Baltimore, 111,000 at Philadelphia and 71,000 at Boston.

The indications so far are that the wheat receipts for the week ending Aug. 25 were about the same as in the previous week, which we are now discussing.

Exports from Atlantic ports for the week ending Aug. 18 have been:

	1880.	1881.	1882.	1883.
Flour, bbls.....	128,700	155,081	154,991	132,010
Grain, bu.....	6,910,928	4,303,022	4,054,437	3,009,760
Total, bu.....	7,490,078	5,000,886	4,751,896	3,003,811

Thus the exports this year were 1,148,000 bushels (24 per cent.) less than last year, 1,397,000 bushels (28 per cent.) less than in 1881, and 3,892,000 (52 per cent.) less than in 1880.

Coal.

Coal tonnages for the week ending Aug. 18 are reported as follows:

	1883.	1882.	Inc. or Dec.	P. c.
Anthracite.....	608,987	644,476	D. 35,489	5.5
Semi-bituminous.....	116,533	86,671	I. 29,862	34.4
Bituminous, Penna.....	71,482	42,705	I. 30,787	71.5
Coke, Penna.....	58,548	47,094	I. 10,854	22.6

The anthracite market continues dull, and the more conservative of the companies are not forcing production or sales just at present. The west-bound traffic, it is said, has been overdone this season, and a large accumulation of coal at Buffalo is reported.

The coal tonnage of the Pennsylvania Railroad for the week ending Aug. 18 was:

	Coal.	Coke.	Total.
Mined on line of road.....	132,031	49,188	181,219
Received from other lines.....	46,650	9,360	56,010
Total.....	178,681	58,548	237,229

The total tonnage this year to Aug. 18 was 7,451,367 tons, as compared with 6,897,613 tons to the same period last year, an increase of 553,754 tons, or 8.1 per cent.

Cumberland coal shipments for the week ending Aug. 25 were 55,742 tons. The total shipments this year to Aug. 25 were 1,450,651 tons, against 628,463 tons to the corresponding date in 1882, an increase of 922,188 tons, or 146.7 per cent. The mines were nearly all idle last year from March 15 to Sept. 1, on account of the miners' strike.

A meeting will be held in Pittsburgh shortly, to arrange for a division of coke traffic between the Pennsylvania, the Baltimore & Ohio, and the Pittsburgh, McKeesport & Youghioghezy roads.

Right of Shippers to Designate Routes.

A dispatch from Chicago, Aug. 25, says: "Judge Moran, in the Circuit Court to-day, granted a temporary injunction restraining J. W. Midgley, as Commissioner of the Southwestern railway pool, from diverting freight over other railroads than over that which consignors desire to send it.

The injunction is granted on the application of the Continental Sugar Refinery of Boston, which tendered certain freight and specified the line over which they desired it shipped, but the Commissioner informed them it would have to go over some other roads. The bill shows it is the custom of the pool to equalize freight carried by various roads in it, and that shippers, in consequence, have no option in the matter. The Sugar Co. asserts that the railway is bound, as a common carrier, to accept and transport all freight tendered, pool regulations to the contrary notwithstanding."

A later dispatch from Chicago says that the freight in question will be shipped over the Rock Island road, as designated by the shippers, but does not state whether the suit will be contested by the Association. The question involved is one of some importance.

Colorado Pool.

The meeting in Boston last week adjourned without taking any further action or agreeing upon a division of business. It was, however, agreed that the roads should continue to work together and maintain rates until the next meeting, when it is expected that the division will be finally agreed on.

South Carolina Commission Rates.

A dispatch from Charleston, S. C., Aug. 24, says: "The South Carolina Railroad Commission has finally adopted a standard schedule of rates and classifications which will control charges on freight and passenger transportation on all the railroads in this state. In June last the Commission proposed a schedule, which was submitted to the railroad companies for consideration. The railroads presented the arguments on the June tariff, which were thoroughly considered, and in some cases allowances have been made. This freight tariff as now adopted does not differ materially from the former tariff. The only important changes are in the rates on cotton and fertilizers. For instance, on cotton the rates are raised 6 cents per 100 pounds for hauls of 50 and 100 miles: 5 cents per 100 for 150 miles; 2½ cents per 100 for 200 miles, and substantially the originally proposed rates are fixed for longer distances. On fertilizers the rates are increased 1½ cents per 100 pounds for 50-mile hauls, and ¼ of a cent per 100 for all distances above 50 miles. The rates established by the Commission are maximum rates only, and railroads may charge lower rates, provided they do not discriminate against any point or persons. Each branch road in the state is subject to the same rates as the main line, and freight passing over the branches and over the main line must be charged for as for a continuous haul. On the main line all leased lines are treated as actual parts of the main line, with the exception of the narrow-gauge roads leased by the Charlotte, Columbia & Augusta Railroad. Under the law which requires the Railroad Commission to make the rates for shorter distances lower than the rates for longer distances, roads which have been charging the same rates for longer and shorter distances will naturally be affected. The rates for shorter distances may probably be lowered, while those for longer distances will in some instances be made higher. This is in accordance with the principle upon which the law is based that freight charges shall be in proportion to the distance the freight is carried. The maximum passenger rates have been increased by allowances to certain roads. In Georgia rates range from 3 to 5 cents a mile, the latter rate being allowed to be charged by some short and weak lines. The rates fixed for South Carolina range from 3 to 4 cents a mile for adults, and allowances have been made to the weaker roads. It is not yet known what course the railroads will pursue with regard to the tariff of the Commission."

Northwestern Traffic Association.

A dispatch from St. Paul, Minn., Aug. 24, says: "The Northwestern Traffic Association met at the Hotel Lafayette, Lake Minnetonka, this morning, to arrange a division of the Pacific Coast business and to define the Northern Pacific's territory. Mr. Carman, Commissioner of the Traffic Association, was not present. Paul Morton, of the Chicago, Burlington & Quincy, arrived in time to be present. J. M. Hannaford was the only representative of the Northern Pacific present. The result of the meeting seemed to be satisfactory to all parties. The same privileges, rates and divisions are given to the Northern Pacific as have been extended to the Union Pacific. Thus, whatever Chicago rates the Union Pacific has made to San Francisco, the Northern Pacific has the privilege of making the same to Portland. This puts Portland and San Francisco on the same basis."

RAILROAD LAW.

Checking Parcels as Baggage.

In the matter of the complaint of James R. Carter against the Boston & Albany Railroad Co., the Massachusetts Railroad Commissioners, after a public hearing, have made the following decision and statement of the law:

Carter vs. Boston & Albany Railroad Co. The petitioner, a passenger from West Newton to Boston, complains that the baggage-master at West Newton refused to receive and check a small package of his personal clothing. A like complaint had been acted on by the Board in May last, and, as no reply was made to our inquiries in this case, a public hearing became necessary.

The statute provision violated is contained in Sec. 182, Chap. 112, Public Statutes, which provides, under a penalty that checks shall be given for baggage. The common law which was disregarded makes it the duty of common carriers to transport a reasonable quantity of personal baggage, provided it is in suitable form to be checked and handled. There is no question that this package was in such form. It was presented at the hearing, and it is manifestly a bundle that could be safely and conveniently carried. The passenger testifies that he distinctly stated that it contained his personal clothing, and we believe him, notwithstanding the equivocating testimony of the baggage-master upon this point, and there is no pretense that the bundle contained merchandise. The only question worthy of consideration is that raised by the General Baggage Agent, viz., that the clothing can not be considered as personal baggage, because the passenger's intention was not to wear it on his journey from West Newton to Boston, but to have it cleaned before he wore it. The Board does not believe that this point is well taken. The liberal decisions of the courts have tended the privileges of travelers as to baggage, and would not exclude a garment which is to be cleaned or repaired. Nor can we believe that the managers of the Boston & Albany Railroad Co. would desire to set up such a defense or to approve such an inquisition into the exact intent of their passengers and the minute details of their wardrobe as would result from such a rule. The Board prefer to think that the baggage-master understood the rule of the company under which he intended to act when he refused to check the article in question.

The Board recommend that all the baggage-masters on the road shall receive the instructions which have already been given to some of them—that a more liberal construction should be given to the rule regulating the transportation of personal luggage.

OLD AND NEW ROADS.

Anniston & Atlantic.—Work is now progressing on this line, the general contractors, E. L. Tyler & Co., having sublet the grading to Renfro & Co., of Atlanta, Ga. They have also contracted for the ties with Housand & Co., of Munford, Ala., and have ordered the rails from a Pittsburgh mill. Under the contracts made, the line from Anniston, Ala., to Talladega is to be completed by Nov. 1, and the 50 miles to Goodwater by the end of the year. There are 10 miles of road completed, from Alabama Furnace to the Clifton iron bank, which will be used as part of the road. Grading is already nearly finished from Anniston to Coldwater, 9 miles.

Atlantic & Pacific.—No date has yet been fixed for the running of through California trains over this road. No reason has been given for the delay.

Augusta & Knoxville.—A dispatch from Augusta, Ga., Aug. 29, says: "The lease of the Augusta & Knoxville Railroad by the Port Royal & Augusta Railroad Co. was perfected to-day for 99 years. The lessees guarantee 5 per cent. to the stockholders and assume the bonded indebtedness of the road, \$630,000 in 7 per cent. bonds. The Port Royal & Augusta road is itself controlled by the Georgia Central, which virtually has effected this transaction. The Augusta & Knoxville road has been finished 70 miles, to Greenwood, S. C., and will be extended to Spartanburg, it is thought, in a short time."

California Southern.—This company having secured favorable decisions from the courts, the Southern Pacific has been obliged to give way, and the crossing over the Southern Pacific tracks at Colton, Cal., has been put in. Work on the extension from Colton to San Bernardino will now be pushed forward.

Canadian Pacific.—A letter of recent date from Ottawa says: "Very little is known by the public about the progress of the Canadian Pacific Railway, in building toward the north shore of Lake Huron. The Sault Ste. Marie Branch leaves the main line at a point called Sudbury, a little to the northwest of Lake Nipissing, and passes through an almost unbroken wilderness for a distance of about 115 miles to Algoma Mills, where for the present the branch will come to an end. The construction of these 115 miles of railway is under the management of a former resident of Brockville, and a great many difficulties have been overcome in the prosecution of the work. Grading and tracklaying have been going on all this season with much alacrity, but it has been found rather a tedious business to keep the navies at work, owing to the prevalence of the black fly and the mosquito. These pests swarm in myriads from one end of the line to the other, and they are even worse than the mosquito in persistence and biting capacity. The immense swamps the road runs through are covered with a dense growth of trees and underbrush, and is the breeding place of these terrible marauders, and also bring forth mosquitoes in clouds. Tracklaying had to be begun from the western end, as there was no rail communication eastward, and rails and supplies were brought by water through the Georgian Bay from Owen Sound and Collingwood to Algoma Mills. The syndicate has six very good stores on the line, from which the various camps are supplied with the necessities of life, and where the men can purchase clothing, tobacco, etc. To distribute these supplies and material along the line is a great work in itself, and requires the aid of three tugs and numerous barges.

"The Spanish River forms an important adjunct, and during the season of navigation the tugs and barges ply constantly between Algoma Mills and Spanish Depot, a point 35 miles up the river, and distant from the mills about 60 miles. East of the mills everything has to be hauled in wagons over cudge roads through the wilderness. Thus far this season upward of 20 miles of grading, mostly through swampy forest land, have been accomplished, and the construction train is busily engaged in laying nearly 60 miles east of Algoma Mills at the rate of about three-quarters of a mile a day. It is proposed to reach Sudbury late in the autumn, and if the main line progresses as fast as it is reported to have done thus far, a through line of railway will then be in operation from Montreal to the north shore of Lake Huron."

Cape Tormentine.—On this road, which is run from Northumberland Straits to the head of the Bay of Fundy, in New Brunswick, work is progressing well. The grading is finished from Baie Verte to Gaspereaux Bridge, 20 miles; 15 miles more are under contract, and the remaining 3 miles will be let as soon as the terminus is finally located. From the terminus on the Straits a ferry will run to Cape Traverse, on Prince Edward Island, a distance of 9 miles.

In connection with this line work has been begun on a branch of the Prince Edward Island road to run from the main line of that road to Cape Traverse, a distance of 13 miles.

Chicago Belt.—The Chicago Tribune of Aug. 28 says: "The Chicago Belt Line Railway is now completed, and business is being done over it from South Chicago to a connection with the Chicago & Pacific Division of the Milwaukee & St. Paul in the town of Jefferson, intersecting every railroad centering in this city. The road would have been completed several months ago, but for the refusal of the trustees of the town of Jefferson to pass an ordinance for crossing two streets within the limits of that town. The ordinance was introduced May 19, and although the railroad officials as well as the most prominent property owners in that section, and among them the Washburn & Moen Co., E. F. Cragin, Elias Greenebaum, and others of equal prominence, made strenuous efforts to induce the trustees to take action in the matter, still they stubbornly refused to do so. They would give no reason for their action, or rather inaction, and charges were freely made that they desired to be lubricated. The company, seeing no way of getting the desired permission to cross the two streets in question to complete its line, and being unwilling to offer a bribe to the trustees for fear, no doubt, that such offer might be rejected, it took the law in its own hands, and last Sunday crossed the streets with its tracks and rails, and ran a locomotive over the same. The baffled trustees endeavored to secure a crowd to tear up the tracks, but the company's employes and the property owners in favor of the road were there in stronger force, and consequently no trouble was made. Last evening the company sued out an injunction to prevent the trustees from interfering with the tracks. The company claims the right of protection from the courts under its franchises. The principal object of the company, however, in suing out an injunction, is to bring the trustees into Court and make them show cause why they have thus far refused to take any action on the ordinance.

Cincinnati, New Orleans & Texas Pacific.—It is reported in Cincinnati that about \$150,000 of the stock of this company has not been accounted for, and it is further rumored that the possession of the stock has been traced to persons who were influential in securing the award of the lease of the Cincinnati Southern road to this company. There is talk of an investigation of the matter.

Connotton Valley.—The new passenger station of this road in Cleveland, O., is very nearly finished. It is conveniently situated and is of sufficient size and well fitted up. An upper story gives room for the general offices of the company. The foundations of the freight station are ready and the building will be put up as fast as possible.

Consolidated Railroad Co. of Vermont.—A dispatch from Burlington, Vt., Aug. 27, says: "Counsel for the Vermont and Canada and the new Consolidated Railroad Co. of Vermont have agreed on a course of action in the Hazard suit. This is brought by Mr. Hazard, a stockholder in the Vermont and Canada Railroad, to prevent the proposed consolidation of the Central Vermont system into the new company, and the wiping out of the Vermont and Canada stock, by its exchange for the bonds which the new corporation is to issue. The hearing will be before Judge Wheeler in the Federal Court, at Burlington, Sept. 5. Senator Edmunds and B. F. Field will appear for the road, and Elias Merwin, of Boston, for Mr. Hazard. The injunction granted by Judge Field against the American Loan and Trust Co., to permit the issue of the bonds, will hinge upon Judge Wheeler's decision. In case he decides that the Vermont and Canada cannot execute a mortgage for the purpose of canceling its own stock, the attorneys for the new corporation are confident that some method will be brought forward to overcome all objections and go on with the consolidation. The delay caused by this suit is the reason for the non-completion of the consolidation before this time."

Defaults on Railroad Bonds.—The Commercial and Financial Chronicle, in its August Investors' Supplement, presents the following table of railroad bonds which have defaulted since 1880, a period in which 25,000 miles of railroad have been built, and more than \$500,000,000 of new railroad bonds placed upon the market:

Connotton Valley:	
1st consol. 5s. and 6s., 1922	\$5,594,000
Danville, Olney & Ohio River:	
1st mortgage 7s., 1910	801,000
Denver & New Orleans:	
1st mortgage	2,286,000
Denver, Utah & Pacific:	
1st mortgage 6s., 1911	412,000
Louisville, Evansville & St. Louis:	
1st mortgage 6s., gold, 1921	3,900,000
2d mortgage 7s., gold, 1902	1,000,000
Little Rock & Fort Smith:	
1st mortgage 1st and 2nd 7s., 1905	2,476,500
Massachusetts Central:	
1st mortgage gold 6s., 1903	3,500,000
New York City & Northern:	
1st mortgage 7s., 1908	264,000
Consol. mortgage 6s., 1910	3,685,000
Richmond & Allegheny:	
1st mortgage 7s., gold, 1920	4,925,000
2d mortgage 6s., gold, 1916	4,000,000
Toledo, Cincinnati & St. Louis:	
1st mortgage 6s., gold, 1921	3,000,000
1st mortgage 6s., gold, 1921	1,250,000
1st Dayton Division, 6s., 1910	1,000,000
1st Cincinnati Division, gold, 6s., 1921	250,000
1st Toledo term, trust 6s., 1910	250,000
1st Southeastern Division, gold, 1921	2,250,000
Equipment 7s. and 6s.	2,052,000
1st Iron Railroad 6s., 1901	500,000
1st Cincinnati Northern 6s., 1920	1,000,000
1st Avondale Branch 6s., 1921	700,000
Total	\$45,085,500

Five of these roads—the Danville, Olney & Ohio River, the Massachusetts Central, the New York City & Northern, the Richmond & Allegheny and the Toledo, Cincinnati & St. Louis, are in the hands of trustees or receivers. Three others—the Connotton Valley, the Louisville, Evansville & St. Louis and the Little Rock & Fort Smith—have asked an extension of time or funding of coupons, which the bondholders will probably grant. In the case of the Denver & New Orleans and the Denver, Utah & Pacific, the securities are chiefly held by construction companies, and have been pledged as collateral for loans; the bonds of the Denver & New Orleans will probably be sold by the creditors, and those of the Denver, Utah & Pacific were sold last week and bought in by stockholders.

Commenting on these defaults the Chronicle says: "Bringing all these various roads together, we find that the actual amount of defaulted indebtedness represented by them aggregates \$45,000,000, as appears by the table. We have included in the list neither stock nor income bonds, but simply the obligations on which the payment of interest was compulsory, so that the table correctly reflects the extent of the disasters as affecting those who held the securities for the annual interest payments which they were supposed to bring. The table is believed to be approximately correct as respects each particular road."

"It is not always easy, however, to get at the exact figures in the case of railroad insolvencies. When a private debtor fails, he is expected to furnish his creditors with a schedule of his assets and liabilities at the earliest opportunity. When a railroad corporation fails, the creditors must run sack back reports and current newspaper items to obtain an idea of the position of the delinquent concern. The creditor in a defaulted railroad finds not only his investment in jeopardy, but to add to his discomfiture, his claims to a knowledge of the road's affairs are often treated with indifference. Why should not the same rule that applies to private insolvencies be made to apply to corporate insolvencies, and the receiver of a defaulting railroad company be compelled to furnish a detailed statement of its funded and floating debt, its liabilities of every description, its assets fixed and available, its earnings, expenses, etc., etc.? The receiver is an officer of the Court, and the Court should require such an exhibit to be made."

Georgia Pacific.—The bridge over the Coosa River is completed, and tracklaying is now in progress westward. At the tunnel, 12 miles west of the Coosa, the work is progressing rapidly. Tracklaying is also in progress from Irondale, Ala., eastward, and the grading on the entire gap to the Coosa is finished, with the exception of the tunnel.

Harrisburg & Western.—This company has bought the Wister Furnace property near Harrisburg, Pa., as a site for its repair shops. The property includes about 12 acres of land, and the price paid was \$60,000. It is said that car shops will be built at once, and will be put at work building the freight equipment for the road.

Jamesville & Washington.—The railroad and property of this company were recently sold at sheriff's sale in Washington, N. C., to satisfy two judgments for damages. The railroad was bought in for \$50, and the timber lands and other real estate for \$1,500. The amount of the judgments was \$2,580. Counsel for the company was present at the sale and gave notice of mortgage liens on the property. The judgments will probably be paid and the property redeemed. The road extends from Jamesville, N. C., to Washington, 22 miles, and is leased to the Norfolk Southern Company.

Lackawanna & Pittsburgh.—Grading is progressing rapidly on the new portion of this road from Perkinsville, N. Y., to Belfast. On the section of 17 miles of the old Allegheny Central track from Angelica to Swains, which is

to be used as part of the main line, preparations are actively in progress for changing the track from 3 ft. to standard gauge.

La Crosse, Iowa & Southwestern.—This company asks the citizens of La Crosse, Wis., to raise by subscription the sum of \$15,000, to be used to pay for surveys of the road and other preliminary expenses.

La Porte & Berenice.—Surveys are nearly completed for this road, which is to run from Danville, Pa., to La Porte, about 45 miles. It will pass chiefly through a broken and mountainous section of Northeastern Pennsylvania.

Louisville, New Orleans & Texas.—The track on this road is now reported laid from New Orleans northwest to Iberville, La., 76 miles, leaving 16 miles to be laid to reach Baton Rouge. The work has been delayed by the bridge building, of which a great deal is required. North of Baton Rouge good progress has been made with the grading, but no track has been laid between that town and Port Gibson.

Maine Central.—At the adjourned meeting of stockholders in Augusta, Me., Aug. 24, the report of the committee appointed at the previous meeting was presented. A resolution was adopted favoring the abandonment of the proposed lease of the Eastern Railroad to the Boston & Maine, and the substitution of a contract for the practical consolidation of the Boston & Maine, the Eastern and the Maine Central companies. The committee was continued, with instructions to report to the board in case such a contract can be made, such report to be submitted to the stockholders at the annual meeting; if no change can be secured and the present contract for lease of the Eastern road is likely to be carried out, the committee is instructed to call another meeting of the stockholders to decide what action should be taken.

Massachusetts Central.—The equipment formerly in use on this road will be sold at public sale in Hudson, Mass., Sept. 12, at 10 a. m., under mortgages given by Norman C. Munson, Contractor for the road, to the Massachusetts Loan & Trust Co. and the American Loan & Trust Co. The sale will include two Rogers and two Schenectady locomotives, all 17 by 24 in. cylinders and 5 ft. driving wheels; 5 passenger cars; 2 combination baggage and smoking cars; 2 baggage and express cars; 2 milk cars; 46 box cars; 25 platform cars and 2 snow-plows. All the equipment is nearly new and has been but little used.

Memphis & Charleston.—It is announced that a majority of the stock of this company has been bought by Geo. L. Seney and others, members of the syndicate which controls the East Tennessee, Virginia & Georgia Co. The purchase includes nearly \$2,700,000 of stock out of a total of \$5,312,000. The price paid varied from about 30 to 47. Part of the stock was bought in open market, the balance from two or three large holders. The purchase will give the East Tennessee Co. absolute control of the Memphis & Charleston and will put a stop to the efforts which have been made from time to time to break the lease of the road to the East Tennessee Co. No change, it is understood, will be made on the road, which will continue to be run under the lease, as heretofore.

Mexican Railroad Notes.—The following notes are from the Mexican Financier of recent date:

The San Martin Texmelucan National Railway carried between Puebla and Texmelucan in the month of June 10, 105 passengers, and 47,780 kilograms of freight. The receipts were \$2,007.55.

The directors of the proposed railway from Tucson to Port Lobos are said to have taken the steps for the formal incorporation of the company, and propose to begin the work very shortly. The company has bought two extensive coal tracts in Sonora. This railway will be of great advantage to the Altar District in Sonora.

On the Hidalgo, Tulancingo & Tuxpam Railway in the month of June, they began the construction of kilometer No. 1 at the junction with the Pachuca line in Tepa. They are making two surveys for the line between Tepa and Tecajete. On the section from Teoloyucan to San Augustin they laid the track, ballasted and graded kilometer No. 22.

The government inspector for the International Railway (Frisbie concession), Mr. Mariano Degollado, has rendered a detailed report of the work on that line for the first 95 kilometers. He reports the line remarkably well constructed. The stations already built are of yellow pine, and of what might be called the second order, constructed on a uniform plan. In Piedras Negras it is likely that a handsome edifice will be substituted eventually.

A dispatch has been received from Count Telfener to the effect that he had safely arrived at Matamoros with his party, well pleased with the prospects of the Tamaulipas International Railway, and he has telegraphed a request that instructions be immediately given to the proper government officials for the opening of the new port of Pescaderia, which in former years was known as the port of Santander, and is about midway between Tampico and Matamoros. It will now be used as the landing-place for the material for constructing the railway. Count Telfener has already purchased in England 10,000 tons of rails and other material, and he proposes to push the work as rapidly as possible. Mr. Mackay, the California millionaire, being one of the principal promoters of the enterprise, there can be no delay for lack of funds. The directors already chosen to assist Count Telfener consist of Gen. Enrique Mexia, Gen. Pedro Baranda, Lic. A. Lancaster Jones, and Mr. Moueta.

The report of the government directors of the Mexican Central of the progress made on the various lines of the company in the month of June shows that on the main division, from Mexico toward Aguascalientes, the number of kilometers of track finished is 588,423, or 307.76 miles, being no change since the last report, on account of the bridge at Encarnacion. On the Tampico & San Luis Potosi Division 114 kilometers or 71.25 miles had been finished; on the Northern Division, from Paso del Norte to Durango, up to June 21, 624 kilometers, or 390 miles, and on the Pacific Division, 1.12 kilometers, making a total of 1,327,432 kilometers or 824.64 miles. The total number of men employed on all the divisions was 20,562. On the Northern Division 108,801 sleepers had been received. The directors reported that as soon as the Encarnacion bridge was finished the tracklaying would continue without intermission to the city of Zacatecas, the grading being nearly completed to that point already. The progress on the Northern Division was wholly satisfactory. The report received from that division was only to June 21, but it was known that the Durango boundary had been passed, and the locomotive was running several kilometers into that state. Progress had been slow on the Tampico Division owing to the rainy season and the scarcity of labor caused by the attendant unhealthiness, but when a more favorable region was reached work would advance as rapidly as on the other parts of the road. In the months of April, May and June 13 vessels arrived at Vera Cruz, with 24,087 tons of material for the company.

The bridge of the International Railway across the Rio Grande at Piedras Negras, built handsomely and solidly of iron, has been named Hidalgo-Washington.

The northern division of the Mexican Central was opened for traffic to Juejuequilla in Chihuahua on July 30. All the plans of the surveys for the parts of the line necessary to make the connection between the two ends north and south have been finished, and presented to the Secretary of Public Works for his approval.

The Mexican Central Railway Company has lately been purchasing iron bridge material in Pennsylvania, instead of in Europe, as formerly. It is found that the American bridges are equally as strong as the British make, although a good deal lighter. The difference in weight affects both the first cost and the freight, and moreover, they can be bought in the United States and delivered in shorter time than when obtained across the water.

A detailed description of the line of the Mexican National Railway between Mexico and Toluca, by the inspecting engineer, Mr. J. Ramon de Ibarrola, was given in the *Diario Oficial* of Aug. 3. The report gives a thorough idea of the magnitude of the work on this section, which crosses the Monte de las Cruces at an elevation of 3,041 meters, or 9,968 feet, above the level of the sea, rising to a height of 801 meters above the city of Mexico and 404 above Toluca, within a distance of 73 kilometers, or a little over 45½ miles.

New Castle & Northern.—The contract for the construction of this road has been let to W. W. Reed, of Erie, Pa., who will begin work at once. The road will be about 16 miles long, extending from New Castle, Pa., northward to Middlesex, where it will connect with the New York, Pennsylvania & Ohio road.

New Orleans & Northeastern.—The track on this road is now laid to a point 140 miles south by east from the starting point at Meridian, Miss., and 38 miles beyond the last point noted. The work is progressing steadily.

New York & New England.—This company on Aug. 21 began using an additional portion of its completed double track, between South Bellingham and Woonsocket Junction, making about 35 miles of double track now open out of Boston. The work of increasing the facilities for handling the rapidly growing and vast traffic of this road is being pushed forward with all energy.

New York, Ontario & Western.—It is again reported that this company will build a branch line from Westboro, N. Y., down the Neversink Valley to Port Jervis, and thence down the Delaware to the Water Gap. The line down the Delaware from Port Jervis was first projected 30 years ago, and several companies have been organized to build it at different times.

New York, West Shore & Buffalo.—Plans have been completed for the passenger station in Buffalo, to be used jointly by this road and the Buffalo, New York & Philadelphia. These plans are described by the Buffalo Express as follows:

"The material to be used for the new depot is brick with terra cotta and Ohio stone trimmings. The base of the structure will be of Onondaga limestone with girders and cornice of iron. The frontage will be on three streets, Exchange, Carroll and Michigan streets, with the principal front on the last. The front runs along Michigan street 208 ft. and along Exchange street 216 ft. At the corner between Exchange and Michigan streets a tower will rise to the height of 130 ft. The main building will be 80 ft. high, with car sheds in the rear 50 ft. in height. The Exchange street front will contain 14 large windows below, and the Michigan street front 23. There will be a large porch of wood, 60 ft. wide, on the Michigan street side or main front. The main building, as indicated by the front dimensions, will be 208 by 216 ft. At the rear three sheds of 66 ft. span each will cover eight separate tracks. These sheds are to be built as need requires. At first they will be 203 ft. wide, but only 140 ft. long. An additional length of 600 ft. will be put on at some future time."

"The basement of the building will be used for kitchen, boiler and engine rooms, laundry, etc. The first floor will be occupied by the grand waiting room, 88 ft. square, and extending up through the other stories. About this will be placed the private waiting rooms for ladies and gentlemen, refectory, conductors' rooms, baggage-room, lavatories, ticket office, etc. The second, third, and fourth floors will be fitted up into rooms for the officers and employees of the roads, and no pains will be spared to make them as convenient as the ample space afforded warrants, while the finish of the whole will be fully equal to anything of the sort in the city. The attic will be utilized for private rooms, to be occupied by such of the officers of the roads as need them. Once completed the general offices of the two roads interested will be removed to these more generous quarters, and the business will take shape naturally from the common centre much more effectively than in the present isolated condition of things."

The Rochester Democrat and Chronicle says of the progress made in Monroe County: "The work on the West Shore Railroad has progressed so steadily and so quietly that the public will be surprised to learn that it is nearly finished. The grading will all be closed out on or before Sept. 30. The proportion remaining unfinished is very small, and is estimated by the engineer at not over a twentieth. The masonry is finished all through the county, and is needless to say is done well. It has been constructed largely of the Union Springs limestone, some few of the structures being laid of the Medina stone. The work is pronounced by competent engineers to be of a quality rarely found on the railroads in this country. The bridges, too, are nearly all of them of any importance as good as finished. The iron bridge over the Genesee River is almost ready to run trains over, and will be so probably by the end of this week. The bridge over the Rochester & Pittsburgh Railroad is up, the riveting completed and is waiting for the ties. The contractors have ordered a large force of tracklayers there for to-morrow morning, and engines, cars and full equipment will be sent there at once. The company has so rapidly pushed the work on the Irondequoit Viaduct, that the great span is now nearly finished, and will be so by Saturday night. There are now four gangs of bridge builders at work in the county, and a fifth is to be added in a few days."

Northern Central.—This company makes the following statement for July and the seven months ending July 31:

	July	1887	Seven months—	1887
Earnings	\$474,624	\$484,333	\$3,419,138	\$3,072,245
Working expenses	276,599	259,678	1,927,278	1,867,120
Extraordinary exps.	21,246	20,458	237,677	177,850
Total exps.	\$297,895	\$280,136	\$2,164,955	\$2,044,970
Net earnings	\$176,629	\$204,397	\$1,254,183	\$1,027,275

This shows for the seven months an increase of \$346,893, or 11.3 per cent., in earnings; an increase of \$60,158, or 3.2 per cent., in working expenses; an increase of \$59,827, or 33.6 per cent., in extraordinary expenses, making an increase of \$119,885, or 5.7 per cent., in total expenses, and an increase of \$226,908, or 22.1 per cent., in net earnings.

Norfolk & Western.—This company makes the follow-

ing statement for July and the seven months ending July 31:

	July.	1883.	1882.	Seven months.	1883.	1882.
Earnings.....	\$219,188	\$191,535	\$142,823	\$1,216,404	\$1,216,404	\$1,216,404
Expenses.....	122,216	106,793	829,714	727,392	727,392	727,392
Net earnings..	\$96,972	\$84,742	\$598,609	\$489,012	\$489,012	\$489,012

For the seven months there was an increase of \$212,129 or 17.4 per cent. in earnings, with an increase of \$102,422, or 14.1 per cent. in expenses, resulting in an increase of \$109,707, or 22.5 per cent. in net earnings.

The New River Division was opened to the coal fields 75 miles, on May 21. The earnings and expenses for the month of July, as given above, embrace, therefore, the entire line, including the New River Division, 503 miles in all.

Northern Pacific.—In St. Paul, Aug. 23, General Manager Haupt received a telegram from Chief Engineer Anderson, announcing the completion of the main line of this road. The telegram stated that the junction was effected at 3 p. m., the tracklayers on both ends laying that day 9 miles and 300 ft. of track, uniting the two ends at a point 55 miles west of Helena, and completing the new transcontinental line. Chief Engineer Anderson was himself upon the ground and personally superintended the work. Back from each end a few rods of spurs were put in, and the connection made by a switch running around the main gap. This was done to allow the passage of President Villard's train, on the occasion of the formal opening of the road. During the past three or four weeks the men have laid a great deal of track, the last 50 miles being put down in less than 20 days. When crossing the mountains the men were compelled to work very slowly, and it was at one time thought that the work could not be completed in the desired time.

The first train to cross was one of the construction trains, which was followed almost immediately by a train that had been running west from Helena to the end of the track. The construction train carried with it all the men at work upon the road in the neighborhood, and the remainder of the day was passed in celebrating the great event. The contractors are the Winston Brothers, of Minneapolis. Aug. 24 mixed trains commenced running regularly between Helena and Missoula. By Sept. 1, when the road will be formally handed over to the operating department, it will be gone over, properly ballasted and put in perfect running order.

The announcement is made that through freight for points in Oregon and Washington will be received at once. The through passenger trains will not be put on until after the formal opening of the road. The Mullan tunnel is not yet completed, and for the present the trains will use the switchback track laid over the mountain at that point, which will remain in use until track can be laid through the tunnel.

The length of the main line as now completed from Duluth, Minn., to Wallula Junction, Wash. Ter., is 1,675.5 miles. From Wallula Junction to Portland, Oregon, 214 miles, the line is continued by the railroad of the Oregon Railway & Navigation Co. From St. Paul, Minn., the real terminus of the road, to Portland, the distance is 1,911 miles, just five miles less than from Omaha to San Francisco by the Union and Central Pacific roads.

To complete the main line as originally proposed there still remains to be built the line from Ainsworth to New Tacoma, on which nothing has yet been done except the construction of 34 miles of track from New Tacoma to the coal mines at Carbonado.

The parties of German and English visitors invited by the company to be present at the ceremonies attending the completion of the main line, arrived in New York this week and have gone west on special trains. A number of the Americans invited to be present have also gone. These invited guests will be taken over the entire line and shown the country served by the road as thoroughly as possible in a trip of this kind.

Ohio Central.—It is stated that negotiations are pending for the lease of this company's newly completed line from Point Pleasant, W. Va., to Charleston to the Chesapeake & Ohio Co. Also, that an agreement has been made for the lease of the Columbus Branch to the new Columbus & Eastern Co. The last named agreement provides that the branch shall be used in common by the Columbus & Eastern and the Ohio Central companies. It is expected that these agreements will be presented to the Ohio Central stockholders for ratification at their annual meeting next month.

The New York Times of Aug. 30 says: "A report was circulated yesterday that the Ohio Central Railroad would default on the first-mortgage bonds of the River Division. Samuel Shethar, the President, said that course was not determined upon. The subject was talked over at a meeting the forepart of the month and the course to be taken would be decided at a meeting to-day. The directors might advance the money themselves."

Ohio & Mississippi.—The English stockholders of this company have been asked to send their proxies for the annual meeting to Blake Brothers & Co., of New York, the object being to secure concerted action with a view to the election of three directors to represent their interests in the board.

Ottawa, Osage City & Council Grove.—The contract for building this road has been let to C. C. T. Holden, of Chicago. The road is to run from Ottawa, Kan., west through Osage City to Council Grove on the Junction City line of the Missouri, Kansas & Texas road. It will be about 75 miles long.

Pennsylvania.—This company's statement for July shows for all lines east of Pittsburgh and Erie, as compared with July, 1892:

A decrease in gross earnings of.....	\$18,200
An increase in expenses of.....	136,159
Net decrease.....	\$154,359
For the seven months ending July 31, as compared with the corresponding period last year, the same lines show:	
An increase in gross earnings of.....	\$1,683,533
An increase in expenses of.....	1,509,188
Net increase.....	\$174,345

All lines west of Pittsburgh and Erie for the seven months of 1893 show a surplus over all liabilities of \$309,690, being a decrease as compared with the same period of 1892 of \$45,340.

The Philadelphia Press of Aug. 30 says: "The construction of the Pennsylvania Schuylkill Valley Railroad is rapidly progressing under the picks and shovels of a large force of workmen. At Manayunk the coffer-dam of the last pier of the railroad bridge at that point over the Schuylkill has been completed and the work of constructing the piers is pushed as rapidly as the stones can be obtained. A temporary trestle has been thrown across the river for the use of the public.

"Through Conshohocken the work goes actively ahead, though there is some difficulty with the Town Council about bridging Oak street of that borough. A large body of labor-

ers are engaged between Norristown and Conshohocken in grading the proposed route. The right of way has been secured, either by purchase or by filing the necessary bonds in court, between the two boroughs. At several points, however, other almost impenetrable obstacles have been encountered in the shape of masses of rock of remarkable hardness. A vein of unusually hard rock at Conshohocken has been struck, which yields but faintly to triple extract of concentrated dynamite.

"A short distance below Magestown there is a cliff of 30,000 yards of rock to be removed. It is so situated that only a small force of workmen can be employed on it, and the debris has to be removed from the upper end of the cut. Contractor Dyer has had two sets of laborers at work on this cut, day and night, for the past month. Dynamite blasts are set off twice a day. On the Earnest farm, near Potts' Landing, there are two cuts of 70 ft. each required.

"On Lafayette street, Norristown, workmen are busily engaged laying down the tracks and paving the street with Belgian blocks, according to the condition annexed to the grant of the right of way. But there seems to be no end of trouble. The tracks have been laid as far as the Reading Company's switch leading to the National Gas Company's works. The grade of the new line is some inches below that of the street and the switch. The switch has been cut, and a frog has been put down. The frog cannot be used unless the grade of the switch is changed, and the matter has become a source of more trouble.

"It is rumored that when Perry's livery stable will be reached, Mr. Perry will resist by injunction the lowering of the grade of the street by the new line. On Lafayette street, between Barbadoes and Markley, the houses purchased by the new company are being torn down to give way to the tracks. Above the borough considerable progress has been made. The tunnel at Phoenixville has been completed to the extent of 40 ft. The new line at Pottstown will necessitate the change of the course of Maxatawny Creek near the Warwick Furnace, and of Tanyard Run above Hanover street.

"One of the chief items of expense in the construction of the new road will be the building of bridges. Besides the extensive and costly iron bridge across the Schuylkill at Manayunk, another large iron bridge is to be built across Fayette street, in Conshohocken, a wooden bridge over Forest street and also a number of stone bridges above that borough. A large iron bridge is to span Stony Creek at the Western end of Norristown, and a stone bridge will be thrown across Saw Mill Run. Another extensive bridge will be built across Perkiomen Creek, the first trestle of which has been raised and is 40 ft. high.

"Several of the larger bridges will be erected by Clark, Reeves & Co., of Phoenixville. Other bridges, the contracts for which have been awarded to Cofrode & Saylor, of the Philadelphia Bridge Co., at Pottstown, will be constructed as follows: Across the Schuylkill in Pottsgrove Township, 660 ft. long; across the Schuylkill at Douglassville, five miles above Pottstown, 660 ft. long; across the Maxatawny at Pottstown, 120 ft. in length; across the canal at Monocacy, Berks County, 160 ft. long; across the canal at Frick's Lock, Chester County, 160 ft. long; two bridges across the canal at Spring City, Chester County, each 160 ft. long."

Philadelphia & Reading.—Work has been begun on a new branch from Pottsville, Pa., to Ashland, about 10 miles. This branch will shorten considerably the distance by rail between Pottsville and Shamokin.

Pittsburgh, Cleveland & Toledo.—Track on this road is now reported laid from New Castle Junction, Pa., west by north to Struthers, O., 17 miles. From Akron, O., the track is also laid for 35 miles, leaving about 3 miles to reach Leavittsburg. Work is well advanced along the line between Struthers and Leavittsburg, and tracklaying there will soon be begun.

Pittsburgh, McKeesport & Youghiogheny.—The repair shops of this road are to be built at Dawson station, near Pittsburgh. The buildings to be erected at present are a round-house of 12 stalls, a machine shop 36 by 62 ft., a water station, coal shed and store-house. Car shops will be added hereafter.

Raleigh & Gaston.—Since June last 700 tons of new steel rails have been laid on this road in place of old iron rails. About 4 miles of track have been ballasted with crushed stone quarried near Franklinton, and the work is progressing as fast as the stone can be prepared.

On the Raleigh & Augusta Air Line extension of this road the track is being ballasted with crushed stone also. The stone used in this case is a conglomerate sandstone quarried near Osgood.

Richmond & Danville.—The following statement of the operations of this company for the nine months of its fiscal year from Oct. 1, 1892, to June 30, 1893, has been made by the board:

Gross earnings from October 1, 1892, to June 30, 1893.....	\$2,861,281
Interest on investments.....	10,661
Total revenue for nine months.....	\$2,871,942
Expenses of maintenance and operation.....	1,626,806
Net revenue for same period.....	\$1,245,136
Interest on mortgage bonds.....	\$220,903
Interest on debenture bonds.....	178,515
Interest on floating debt.....	70,135
Interest on N. W. N. C. bonds.....	685
Rental Piedmont Railroad.....	45,000
Rental North Carolina Railroad.....	195,000
Rental Atlanta & Charlotte Air Line.....	349,875
Rental Richmond, York River & Chesapeake.....	64,388
	1,244,401

Excess of revenues over expenses and liabilities.. \$120,736

There has also been expended in the same period for construction and equipment:

Richmond & Danville and Piedmont railroads for new depots, real estate, water, wood and coal stations.....	\$49,300
For cars, locomotives, machinery and tools for shops.....	135,873
Richmond, York River & Chesapeake, for wharves and terminal improvements.....	4,854
Atlanta & Charlotte Air Line, for betterments to roads, tracks and bridges, buildings above ordinary maintenance, made in pursuance of contract.....	148,662

Total expended for new property, construction and equipment..... \$338,689

At the close of the last fiscal year the floating debt, as represented by bills payable, amounted to \$1,214,000. On June 30 last the amount of this debt was \$1,073,000. From the statement above made, the directors think that the company can provide for its fixed charges and for necessary improvements without increasing the debt. It is thought well, however, to provide for the present floating debt as soon as possible; the statement says on this point:

"But the board are of the opinion that a floating debt of the magnitude stated, carried on the uncertainties of the market, is not a desirable condition under which the company may best conduct its affairs with reference to safety and net incomes to its stockholders. The collaterals on which such debt is being carried are its investments in 75,000 shares of the capital stock of the Richmond & West

Point Terminal Railway & Warehouse Co., and about \$530,000 bonds of the same company, the former of which, in the judgment of the board, it is essential and vitally important to the company should not be put at any hazard, such as might occur in the vicissitudes of the possible commercial panics that are liable at any time to arise, should any such occur, and that it would be wise for the latter to be held as a reserve fund, to meet the engagements of the company on car-trusts and other construction expenses and annual betterments on the Atlanta & Charlotte Railway as stipulated for in our contract with that company."

For these reasons the board, as constituted at the time the statement was prepared and a special meeting of stockholders called, recommended the increase of the capital stock from \$5,000,000 to \$7,000,000, the additional \$2,000,000 stock to be sold for the purpose of providing for the floating debt.

It is understood that the parties who have now acquired control of the company are opposed to the issue of new stock, and that it will probably be voted down at the meeting.

Southeastern, of Canada.—Fresh reports have been in circulation as to the sale of this road to the so-called Chapman syndicate, but nothing definite has been settled, apparently. A Boston dispatch says that the sale has been completed, and that the road will shortly be transferred. Some of the directors, however, have said that the report was false, but Mr. Barlow insists that the sale has been fully agreed on at a price not stated, but sufficient to clear off the company's debt.

St. Paul & Duluth.—Grading is now about completed on the branch line from Rush City, Minn., northeast to Grantsburg, Wis., and tracklaying has been begun. The bridge over the St. Croix River is to be completed by the end of the month, and there will then be nothing to delay the work. The distance from Rush City to Grantsburg is about 20 miles.

Tennessee Railroad Taxation.—Suits are to be begun to recover back taxes claimed to be due from a number of railroads in the state, most of them claiming exemption by their charters from the additional taxes sought to be collected from them under a construction of the law made by the Attorney-General. The amounts involved are not very large, that claimed from the Louisville & Nashville being only a little over \$30,000.

Texas, Oklahoma & Kansas.—This company has been organized to build a railroad from Aransas Pass, Tex., on the Gulf coast, about 170 miles southwest of Galveston, northward via Brownwood, Cisco and Graham to Red River, and thence through the Indian Territory and Kansas to Kansas City, Mo. The main line thus proposed is nearly 950 miles long. Branches to Fort Worth and other points in Texas are also projected. The company is now asking the towns along the line in Texas for subscriptions and grants of aid.

Union Pacific.—The track on this company's Oregon Short Line is now laid to Kuna, Idaho, 127 miles westward from Shoshone Junction, and 448 miles from the junction with the Union Pacific main line at Granger, Wyo. Nearly all the grading is done on the 92 miles from Kuna to Burnt River, where the Short Line is to connect with the Oregon Railway & Navigation line, and tracklaying is progressing steadily.

A large force of laborers, recently employed on the Oregon Short Line, have been transferred to Colorado and put to work on the extension of the Denver & South Park Division from Dillon to Leadville.

Valley of Virginia.—Track on the extension of this road from Staunton, Va., to Lexington is now laid for 30½ miles southward from Staunton and 56½ miles from the northern terminus of the road at Harrisonburg. There are 5½ miles yet to be laid to reach Lexington, and the road will probably be completed to Lexington early in September.

Vicksburg, Shreveport & Pacific.—On the extension of this road from Monroe, La., to Shreveport, tracklaying has been begun. The grading is entirely finished for 13 miles.

Wabash, St. Louis & Pacific.—A report has been current on Wall Street this week that negotiations are pending for a lease of all this company's lines east of the Mississippi to the Lake Shore & Michigan Southern Co., the Missouri Pacific to retain its control of the lines west of the Mississippi. It is said that the Lake Shore has made a definite offer, which is under consideration. It has been impossible to ascertain whether there is any basis of truth for these reports.

The work of arranging this road in districts or subdivisions has been completed by Col. R. Andrews, General Superintendent. K. H. Wade, Superintendent of Transportation, and Superintendent George Stevens, of the Fort Wayne Division. The districts are as follows: First District, Toledo, to Andrews; Second, Andrews to Tilton and Covington Branch; Third, Detroit to Butler and Toledo Branch; Fourth, Butler to Logansport; Fifth, Michigan City to Peru; Sixth, Peru to Indianapolis; Seventh, Tilton to Mount Carmel and Vincennes Branch; Eighth, Mount Carmel to Cairo; Ninth, West Lebanon to Leroy; Tenth, Tilton to Springfield and Monticello Branch; Eleventh, Springfield to Hannibal and Pittsburg Branch; Twelfth, Council Bluffs to Quincy and Keokuk Branch; Thirteenth, Chicago to Bement; Fourteenth, Decatur to East St. Louis; Fifteenth, Bement to Altamont and Effingham Branch; Sixteenth, Cates to Grafton; Seventeenth, Quincy to Trenton; Eighteenth, State Line to Peoria and Streator Branch; Nineteenth, Peoria to Keokuk, Warsaw and Burlington branches; Twentieth, Peoria to Jacksonville; Twenty-first, Havana to Sidney; Twenty-second, Havana to Springfield; Twenty-third, Keokuk to Humeston; Twenty-fourth, Relay to Des Moines; Twenty-fifth, Des Moines to Fonda and Boone Branch; Twenty-sixth, St. Louis to Moberly and Columbia Branch; Twenty-seventh, Moberly to Kansas City and Glasgow Branch; Twenty-eighth, Moberly to Ottumwa; Twenty-ninth, St. Joseph to Lexington Junction; Thirtieth, Brunswick to Stanberry; Thirty-first, Stanberry to Council Bluffs and Clarinda Branch.

West Pennsylvania & Shenango Connecting.—This road was formally opened for business Aug. 29, when an excursion train passed over the line with a number of invited guests. Regular trains begin to run Sept. 1. The new line extends the Shenango & Allegheny road to a connection with the Butler Branch of the Pennsylvania Railroad.

West Virginia Coal & Iron.—This company proposes to build a railroad from Strasburg, Va., westward to a connection with the West Virginia Central & Pittsburgh road in Tucker County, W. Va. The line is about 70 miles long, and will pass through extensive deposits of iron ore and coal, which are not now worked on account of the lack of transportation facilities. Grant and Hardy counties in West Virginia are to vote shortly on the question of subscribing to the stock of the road.